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Satellite Applications For Home and Business

March/April 1986

RSi Tracks The Stars

* **Clearing Up Ku Confusion**
* **Life After Scrambling**
* **Viewpoint: M/A-Com's VideoCipher**

Opportunities Expo! Nashville April 6-8 See Pages 38-41

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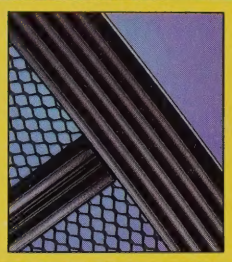

Sculptured reflector ring assures unmatched strength and parabolic shape.

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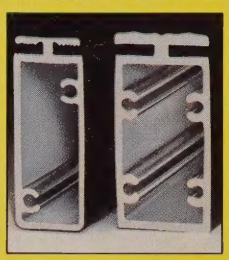

Four internal reinforcing channels while other antennas have only one or two.

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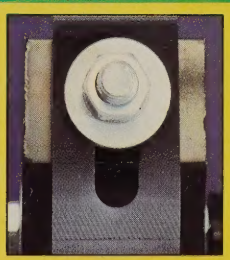

Deep extruded ridges on *both* gripper panels.

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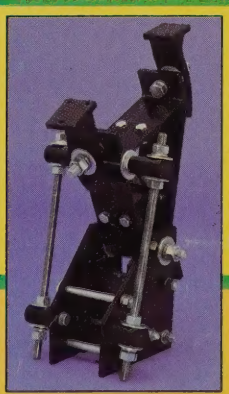

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The Global Village

Futurists have envisioned our world becoming a global village as the arms of many nations are extended to outer space through satellite technology. Satellites throughout the Clark Belt signal the approaching day when instant communications between businesses and homes throughout the world will be possible and the global village a reality.

A man who has made one of the most significant contributions to communications technology is Dr. Yoshihiro Konishi. A soft spoken gentleman with a large reservoir of knowledge, Dr. Konishi is a recipient of Japan's Medal of Honor with Purple Ribbon. Dr. Konishi, who joined Uniden Satellite Technology in 1983, served as Director of Research and Senior Research Fellow for NHK, Japan Broadcasting Corporation, and directed that nation's two year experimental project in direct broadcast service. As a result of that research, Japan's highly regarded nationwide Ku-band broadcasting system was established. Dr. Konishi is clearly one of the world's leading scientists in Ku technology. We are extremely pleased that Uniden will sponsor a keynote address by Dr. Konishi at the SATELLITE OPPORTUNITIES EXPO for Business and Home, April 6, 7 and 8, in Nashville.

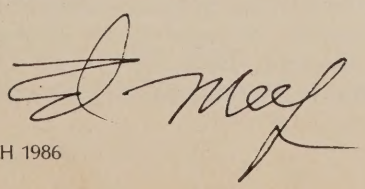
Dr. Konishi joins a long list of distinguished leaders participating in the national satellite business conference which is being held as part of the EXPO. Larry Speakes, Deputy White House Press Secretary, will also serve as a keynote speaker. Other speakers will include Eddie Fritts, president and CEO of the National Association of Broadcasters; Sidney Topol, chairman of Scientific Atlanta; Dr. C. J. Waylan, president of GTE Spacenet Corporation; Jim Bunker, senior vice president corporate marketing, M/A-Com; Hans Giner, president of Luxor North America; Hiro Sugiyama, president of DX Communications; Taylor Howard, president of Chaparral; Fred Del Toro, senior vice president, Hi-Net, Holiday Inn, Inc.; Jim Whitworth, managing director, Systems Engineering, Federal Express; Charles Zito, vice president and general manager, Network Products Division, COMSAT; David Hogan, vice president, marketing, Mobile Communications of America.

The EXPO will feature two special tracks, one for business-to-business communications users and providers of services, and a separate seminar series for home entertainment TVRO DBS. The satellite business conference track will provide participants an overview of technology developments and marketing opportunities ranging from domestic to international applications in DBS, business-to-business services, nationwide paging, cable TV and broadcasting. The home entertainment TVRO track will include special seminars on Ku technology, marketing opportunities, and applications which are envisioned for the decades ahead.

The SATELLITE OPPORTUNITIES EXPO is unique, representing the emergence of new applications for satellite direct services and the merging of C-band and Ku-band technologies plus the application of these technologies in both business and home.

We hope you will be with us. You'll find more details and exhibitor and pre-registration materials on pages___.

See you in Nashville April 6, 7 and 8!



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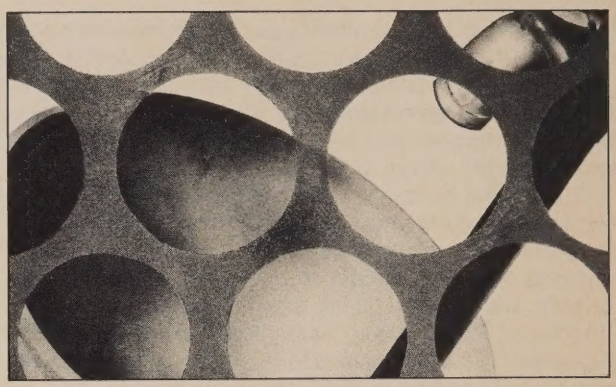

Cover Story: RSi Tracks The Stars
From radar towers to submarines, RSi's antenna products have long been an integral part of the nation's defense systems. In the commercial market, its growth and expansion have rivaled big-name competitors in the race to field top-quality products for both business and home applications.

Business Communications

Ku Links 7-Eleven Stores
Southland Corporation, parent company of 7-Eleven stores, has opted for an efficient Ku-band national private satellite network for data and voice communications.

Company Expansion Linked To Ku-band
The future looks bright for California Microwave, Inc. 1985 sales topped $105 million and as Ku-band technology continues to develop, California Microwave sees even more opportunities ahead.

Home Entertainment

The Evolving Ku Market
In a mood reminiscent of C-band pioneer days, Ku-band home entertainment TVRO products are going through what may be called the next generation of satellite TV Trial-and-Error. For manufacturers, it's back to the drawing board to design products commensurate with the austere characteristics of Ku-band transmissions. That spells opportunities for everyone, because like C-band, it leads to high-quality products that get the job done.

Ku-band Installation Tips
A Texas dealer with Ku-band installation experience passes along helpful advice for others wanting to take advantage of Ku-band's marketplace potential.

Antenna Manufacturer Gears Up For Ku Market
Certified Industries, Searcy, Ark., has strong experience in manufacturing both mesh and solid antennas, and now is turning its attention to the Ku-band market.

European Satellite TV: A New Market For U.S.
Opportunities are excellent for U.S. manufacturers in the developing European satellite market.

Departments

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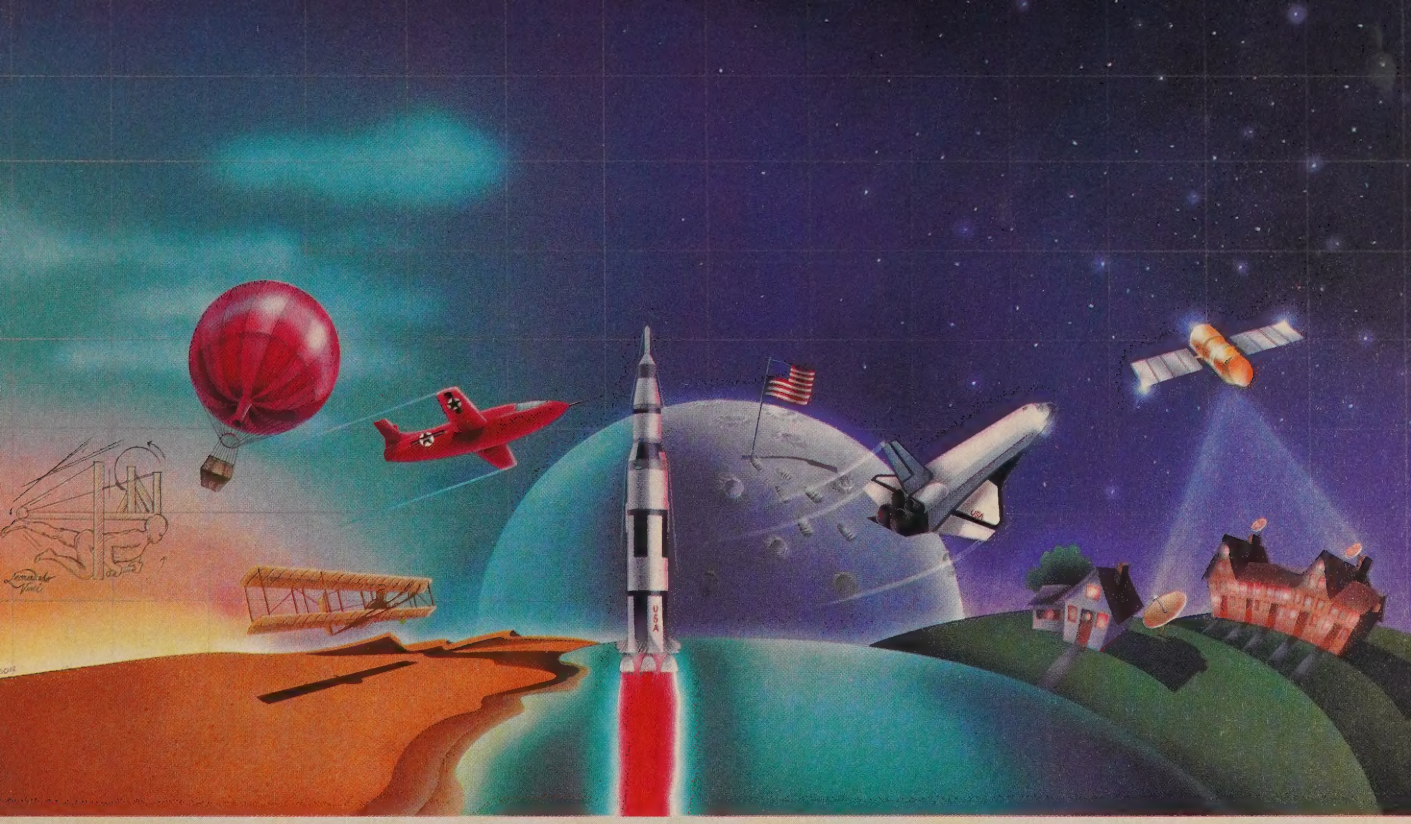
Up & Coming
Engineer's Angle
Viewpoint
Technology Review

Ku-band WORLD
Satellite Applications For Home and Business

About the cover
RSi provides a wide range of antenna products to meet the growing demand for international satellite communications. Examples are the 13-meter and 9.2-meter satellite earth station systems shown at San Ramon, Calif. Cover photo by Jeff Zaruba, Los Angeles.



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Not only is RSi reaching for the stars in its acquisition of small companies to fill its corporate needs, but it is also literally listening to the stars. One of its subsidiaries is building 10 82-foot earth stations for scientists of the National Radioastronomy program to listen to deep space.

RSi Tracks The Stars

by John Brannon

In the year 2010 when we make contact, 10 gigantic satellite earth stations may receive the first whispers of life from deep space.

The movie "2010" is a popular fictional story about mankind's first contact with extra-terrestrial life. But the 10 earth stations that may help make "contact" possible are rapidly becoming a reality. The first two are under construction in a program funded by the National Science Foundation. The program is known as the Very Long Base Array (VLBA).

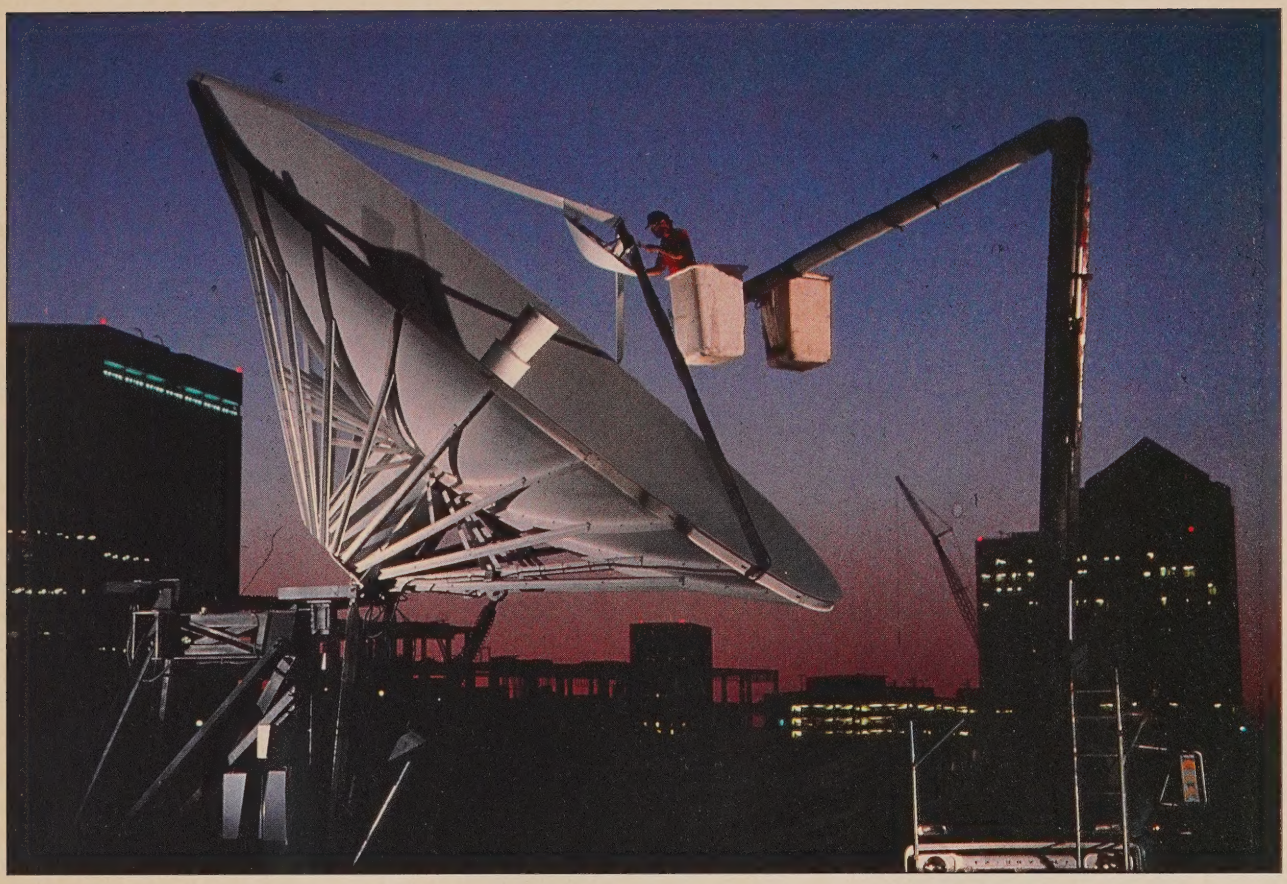
Radiation Systems, Inc., an antenna technology group based at Sterling, Va., is active in the VLBA and other programs. One of its subsidiary companies, Mexia Fabricators, Mexia, Texas, is building the earth stations.

The basic concept of VLBA calls for 10 earth stations located from Hawaii, across the continental U.S., to the Virgin Islands, a 5,000-mile-long radio observatory. Scientists working in the VLBA program are searching for signals from natural sources in outer space, such as signals from stars, galaxies or clouds of gas. They are not looking for external intelligence, but the 10 earth stations could track virtually any object moving in outer space. Each earth station will have communications with the others in the observatory.

Each VLBA earth station will have an 82-foot parabolic antenna using specially designed reflector panels cut to an accuracy of .014 RMS. Using specially designed feedhorns and receivers, the antennas are capable of receiving signals in frequencies from 300 MHz to 86 GHz. Completion is scheduled for about 1992.

Richard Thomas, president and chief executive officer of RSi, said the project is extremely expansive for the company that exclusively builds antennas. "Our capability is expected to touch virtually every area of antenna communications," he said.

RSi was established in 1960 as a small



RSi's 9.2-meter satellite earth station antenna being installed at the Dallas-Fort Worth Teleport facility is representative of new installations close to major U.S. cities providing both uplink and downlink capability for local customers.

company that designed and developed tactical, troposcatter and microwave communications systems for the U.S. Armed Forces, and did fairly well, according to Thomas. But dependence solely on the military market yielded more lean years than fat ones for RSi. In the 1970s the firm turned its attention toward the commercial market and diversified its product lines.

Apparently, that management decision spelled success for the small antenna company. A sampling of annual sales figures serves as an example of growth. In 1978 RSi's annual sales were about $4 million, and its stock was traded at $3 per share. In 1985 sales were $33 million, and stock traded for $14.50 per share, having split three-for-two three times.

RSi produces antennas for domestic and international satellite communications, domestic and international military communications, point-to-point microwave communications, air traffic control, and lately, home TVRO.

Some blue chip names are listed among its customers. Satellite earth station antennas are produced for common carriers, broadcast and cable TV, private business networks, teleports and government agencies. Some common carriers who are established customers are AT&T, RCA American, Western Union, American Satellite, GTE Spacenet and MCI. Both C-band and Ku-band antennas are supplied for those markets. C-band antenna range from seven to 18.3 meters. Ku-band antennas from 5.5 to 13 meters.

In 1985, Hubbard Communications, Inc., selected RSi as its sole supplier of 5.5-meter Ku-band antennas used at TV stations to receive transmissions from satellite news-gathering vans. Satcom Technologies, Inc., Atlanta, another RSi subsidiary, produces the antennas for HubCom.

"We primarily selected Satcom Technologies because of its ability to react and give us the specialized service that we require in servicing the broadcast industry," said Bud Henley, operations manager,

The Medium Range Transportable Antenna Group (MRT-2) is designed to meet foreign military requirements. It consists of two 15-foot antennas stowed on a rugged pallet transportable by helicopter, C-130 aircraft, truck or mobilizer.

HubCom. "We've enjoyed a good relationship with them, and plan on giving them a lot more business in 1986."

RSi also won a contract to provide 600 Ku-band antennas for Hi-Net Communications, Inc., the satellite entertainment network of Holiday Inns, Inc. Construction and installation of the 5-meter antennas at each participating Holiday Inn began in November 1985 and should be completed about April 1986.

"With this larger antenna, you could anticipate it will have better margins, particularly in the wetland areas where you have heavy rainfall at this higher frequency, and particularly if you're transmitting at 14.25 GHz up to the transponder, which Hi-Net intends to do," said Cliff Allison, RSi vice president for programs and resources. "The administrative part (of the project) is a bigger headache than actual construction, getting contracts and licenses and those kinds of details worked out.

"Over the past several years we have developed two-degree spacing-compliant antenna products for the Ku-band. We are the leaders in being able to build accurate panels. That's the key to it all. Like the panels for the radio-telescope projects, they're like a piece of newspaper. We're also building panels to work at 18 to 23 GHz, the KA-band."

RSi's subsidiary companies are (in order of acquisition) Universal Antennas, Inc., Dallas; Satcom Technologies, Inc., Atlanta; Mexia Fabricators, Mexia, Texas; Mark Antennas, Inc., Des Plaines, Ill.; and Laux Communications, Inc., Cincinnati.

Each was acquired step-by-step in a purposeful manner of evaluating the contribution it could make to the corporation's placement in the commercial antenna marketplace. Thomas said it's basically a matter of knowing where you want your company to go, and what product you'll offer when you get there.

"The corporation strongly believes in only being involved in the kinds of businesses that we understand and have administrative and technical capabilities," he said. "We must understand its market and the total nature of its products. We are very good at evaluating the people, the principles of these companies, to determine whether they will fit what we consider to be an RSi image.

"Once that's been determined, we formulate a business plan which speaks to the amount of sales they are expected to generate within a given time, what the profit expectancy is, what kind of funds are required for overhead expenditures and for adding additional people. Once these things are ironed out and agreed to, we leave them alone, in order for them to demonstrate to us that they are capable of running the business."

If it turns out that a company is not meeting established goals, then RSi will step in and take action. But Thomas said that has not happened. To this good record he attributes establishing a solid business plan from the outset of acquisition of a company, and having the company adhere

to the plan.

That plan includes a mission statement for the company, which specifies its role in the overall corporate business strategy.

Universal Antennas, Inc. produces much larger antennas than its sister company, Mark Antennas, Inc. C. J. Beuley, UA president, said, "When you address Ku-band from a commercial point of view, UA's charter is to build antennas that start around the 12-meter range and go up to 32 meters in diameter." Some of UA's antennas were used in the IntelSat market. IntelSat-A-station antennas are 32-meter beam waveguide antennas, and IntelSat B-station antennas are 13 meter. UA antennas have been used by Hughes Communications, GTE, GTE Spacenet, and others. "So the technology is within the design group and manufacturing capabilities to build antennas all the way up to 32 meters that will work, at least to the Ku-band, which is a difficult feat. The larger the antenna gets, holding the surface accuracy becomes more difficult."

Mark Antennas, Inc., manufactures the base station cellulars, as well as microwave, both grid and solid parabolic from 2 GHz through 24 GHz, and satellite antennas five meters and below. "For our division, we see that most of the 1980s we should have a very strong and growing market," said Mary Earhart, general manager, Mark Antennas.

Satcom Technologies, Inc., produces solid antennas for the satellite earth station antenna market. Those antennas range in size from five to 11.3 meters, in both the C-band and Ku-band applications. AT&T, American Satellite, and MCI are some of its customers.

David Speed, Satcom marketing director, noted that the company's 5.5-meter Ku-band antennas are being used by satellite news gathering organizations. "I see a lot of potential for Ku-band," Speed said. "A lot of broadcasting people are going to be looking at some Ku-band satellites that have information on them they want to broadcast. And there are others who want to get on Ku-band with programming. So that means that TV stations are going to need some Ku-band downlinks.

"Ku-band also has a great potential for business communications. There are a number of companies, both carriers and suppliers, that are pursuing the business communications market."

In December 1985 RSi acquired Laux Communications, Inc., Cincinnati, a longtime manufacturer of antennas for home TVRO. Bringing LauxComm into the House of RSi was the firm's initial entry into the home systems market. Pat Laux, vice president, LauxComms, said RSi will bring additional resources that will allow his company to grow and become more competitive in the TVRO marketplace.

Laux said he estimates there are about 115 manufacturers of antennas for TVRO, but a shake-out is right around the corner, and only the strongest will survive.

"The sheer numbers of antennas being manufactured will allow the major companies to be not only the quality producers, but also the low-cost producers," Laux said. "So I see a very big shake-out in the number of antenna producers in this business.

"One of the things that will contribute to the growth of major companies and increase their market in TVRO antennas, is the requirement for efficient operation at Ku-band. There are wild claims being made by manufacturers of off-brand antennas that their products are going to perform at Ku-band. Frankly, unless they can show me a range result where they acheive at least 41 dB gain at 12 GHz, then I don't believe them."

LauxComm produces the Beta-9 solid and Beta-9 perforated 9-foot antennas, and recently, the Beta 6.5 antenna, for TVRO. All are made of double galvanized steel.

Thomas said RSi's success is largely attributed to its people both at corporate level and in the subsidiary companies. All have contributed to what he terms "understanding where we are going."

What that means, he said, is RSi's goal is to breathe hot on the heels of its major competitors, Andrew and Scientific-Atlanta. Meanwhile, acquiring other companies that fit RSi's needs is a definite possibility.

"Our principle objective is to continue to grow at a rate of about 30 percent a year," Thomas said. "We're expecting that within three years we will have sales in excess of $100 million a year.

"My advice to any company is understand where you're going, make sure that when you get there, there's going to be a product and a need for that product, and that you know enough about that product that you can build it at a price you can predetermine before you take any contracts, so that what you're doing is assuring yourself of a profit at the bottom line. ■

VLBA Program

Like standing in Washington, D. C. and reading a newspaper in San Francisco.

That's how Peter Napier, deputy project manager, VLBA, characterizes the precision of some unusual antennas now under construction.

VLBA, or Very Large Baseline Array, is a federally funded science project to listen to transmissions from deep space. Natural transmissions, that is, from such phenomena as galaxies, quasars and clouds of gas from here to wherever the universe ends.

Ten earth stations, each with an antenna 82 feet in diameter, will be constructed from Hawaii, across the U.S., and the Virgin Islands. Napier said the 10 will be interconnected, and an object in outer space can be tracked and recorded, and its data subjected to minute analysis. The chain of earth stations will actually be one large observing station 5,000 miles long.

"It's a major and complicated project," Napier said. "We're looking at the signals from natural sources. In no sense are we involved in looking for external intelligence. We are doing radio astronomy, the same thing that optical astronomers do, except that we're looking at the astronomical objects—stars, galaxies—and we're doing it at radio wavelengths. It's basic research that will increase man's knowledge of the universe that surrounds us."

The earth stations are being built by Universal Antennas, Inc., Dallas, and its sister company, Mexia Fabricators, Mexia, Texas. Locations of the stations in the 5,000 mile chain are Hawaii; Owens Valley, Calif.; Brewster, Wash.; Kit Peak, Ariz.; Los Alamos, N. M.; Pietown, N. M.; Fort Davis, Texas; North Lib-

erty, Iowa; Massachusetts; and St. Croix, Virgin Islands. Each antenna costs about $2.3 million.

VLBA has a predecessor in radioastronomy, the VLA project—Very Large Array—made up of 27 82-foot antennas already in a 30-mile section of central New Mexico.

"The problem is that those antennas are designed for celestial tracking rates, which means they usually can't be used for objects that are moving very rapidly across the sky," Napier said. "The new instrument (VLBA) is the next generation. You should think of VLBA as one telescope. Each site should be called an observing station rather than an observatory. The whole instrument will be an observatory.

"At each station we will have a very high accuracy atomic clock and an extremely broadband tape recorder. Each of these antenna observe the same astronomical object at the same time, and record the wideband signals received from natural sources. Then bring those tape recordings together at a common place and play them back into a very special purpose homebuilt computer that combines all the signals received by all the antennas together to give you the resulting high resolution image."

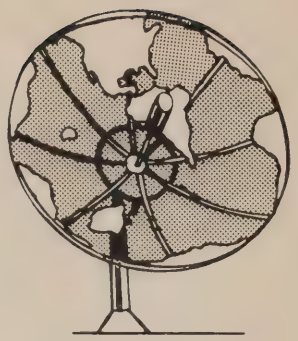
There are special problems associated with receiving, tracking and recording signals from deep space. For starters, by the time the signals reach earth, they're usually very weak, which is why so large an antenna is required. "In the receiver of one antenna, the amount of noise from a receiver will sometimes be as much as a million times more than the amount of signal received by the antenna. It's not until you've integrated for a very long time that you beat the noise down to where you can see the signal. You don't talk about signal-to-noise ratios in radioastronomy, you talk about noise-to-signal ratios."

Specialized feedhorns and receivers are a must for the systems. "Historically, radio astronomers have built their own equipment because of their special needs. We've always been pretty much at the edge of the state-of-the-art because the objects that we're looking at are so weak. It's always the case that if you can get a little bit more sensitivity, you can see more objects. It brings the objects into view. You can see farther out into the universe. We've practically built our own equipment, except for the big antennas. All the cryogenically-cooled receivers, the special purpose digital machinery; we build that. On this project, there'll be a little more contracting out—hydrogen lasers, for example. Atomic clocks; we'll buy those. But the broad-band tape recorders will be specially built for this project."

Napier said each antenna has many feedhorns, all in position at the same time, and can be used in various combinations. The frequencies that are going to be supported are 327 MHz, 610 MHz, 1.5 GHz, 2.3 GHz, 4.8 GHz, 8.4 GHz, 15.4 GHz, ("actually, 14.9 GHz is the middle of our Ku-band"), 22 GHz, 44 GHz, and eventually, 86 GHz. "That's top frequency, 86 GHz. We're not actually building receivers for it out of our construction funding. We think that's something that will come along later, but we have built the capability in the antennas to go to that very high frequency.

"About the feedhorns—the first two frequencies, 300 and 600 MHz—they are the prime focus, just little crossed dipoles terminally mounted in the middle of the subreflector. Then all the other frequencies are at secondary focus, so those feeds are bigger. The "L" band, the 1.5 GHz feed, is a big one, about 54 inches in aperture by some 120 inches long. Then the other frequencies are proportionally smaller as you go higher in frequency.

"The reason the antennas are so



large, that at that high frequency, the signals that we receive are just incredibly weak and we need as much collecting area as we can get to get as much signal as we can."

Could the VLBA be used to receive signals from extra-terrestrial life?

"VLBA is a lot of antennas, but you still don't have enough collecting area. You just need more collecting area than we're talking about here. You need something like the huge dish at Aracebo, Puerto Rico, the big 300-meter spherical dish that's hollowed out of a bowl in the ground. You'd need something of that size to have a reasonable chance of detecting signals out there."

But natural radio signals will be able to be received by VLBA, he said. "The most active quasar are many billions of light years away, and we will be able to see them, so very close to the edge of the universe. I can't give you an exact answer, because nobody really knows where the edge is. The radio signals have been traveling to us many billions of years." ■

Home Entertainment Opens Up Ku-Market

The home entertainment market for Ku-band equipment will be a primary factor in creating a much larger business market for Ku-band equipment and services.

That's the view of Peter Van der Gracht, president of Nexus Engineering in Canada.

"I think entertainment TV is going to lead the way. It's going to be the first application, and push manufacturers like ourselves to develop low-cost hardware for that market, and then once that develops, then the opportunities are there for the business user as well," Gracht said.

Gracht recalled that in the early days of satellite delivery of programming for cable companies, equipment was very expensive. But, as interest in home entertainment grew the demand created both by cable systems and home owners brought the price of receiving technology down dramatically, thus expanding the market.

"We're certainly very excited about Ku-band, not just for the entertainment market, but also for the two-way business market."

FEDEX PROFITS UP

Federal Express Corporation reported higher profits for its second quarter ending Nov. 30, 1985, but the firm continued to lose money on ZapMail, its two-hour facsimile delivery service. Despite handling 629,000 transmissions during the quarter, ZapMail lost $30 million during the three month period, compared to $28 million in the second quarter of the last fiscal year.

Performance (six months ending Nov. 30):

Revenues—
1985—$1.21 billion
1984—$924.3 million
Net Profits—
1985—$66.6 million
1984—$18.5 million
Share Earnings—
1985—$1.37
1984—$0.39
Per change: +251.3

HARRIS' FIRST TV ADS

Harris Corporation began its first TV ads Feb. 2, 1986, featuring the famous husband-wife team, Stiller and Meara. The ads aired on all three major networks and some cable programs. The TV ads are part of Harris' $20 million ad campaign with Stiller and Meara in both radio and print media advertising in national business, news and trade publications. Raymond J. Oglethorpe, Harris corporate vice president of marketing, said the advertising effort is aimed at establishing the Harris name and generating a good feeling toward Harris among its business customers. "We want the business community to be aware of Harris as a dependable source of advanced information processing, communication and microelectronic products, systems and networks," Oglethorpe said. Harris is a $2.3 billion producer of state-of-the-art information advertising, communication and microelectronic products for the worldwide information technology market. The company employs 31,000 people and operates 35 plants in the U.S. and abroad.

ATA HOLDS ANNUAL MEETING

American Teleport Association held its annual meeting Jan. 27 at Capitol Hilton. Speakers included Congressman Thomas Tauke; Thomas Rogers, senior counsel of the House Subcommittee on Telecommunications, Consumer Protection and Finance; former FCC Commissioner Henry Rivera, and other leading figures in the communications industry. ATA President Robert Schmidt said, "This was a very important meeting for this growing industry, which has already invested over $200 million in new local networks and long distance gateway facilities. It is anticipated that in 1986 this number will double. This confirms that teleports are playing an increasing role in the competitive communications marketplace." Some of the topics discussed were "Changing International Communications and Teleports Potential Role,"; "The Future of Teleport Services under Deregulation in the Competitive Marketplace," and, "The Future of International Opportunities."

NO ELECTRONIC SPOOKS

TRW Digital Systems, Lawndale, Calif., announced it has received a major order of its new Secure Digital TV System. The TRW system, scheduled for delivery earlier this year, uses digital encoding and decoding techniques to protect a corporate owned and operated video conferencing network from unwanted signal eavesdroppers. The private satellite TV network is used for a variety of communications including training, marketing and corporate information programs. The TRW system will include several encoders at the broadcast location and decoders at all of the customer's major sites throughout North America. It permits as many as 65,000 individual decoders to be addressed in a single network through a control computer.

No more waiting in line for available phone lines, no more being at the mercy of fickle terrestial communications. It's a classic example of the practicality and wonder of private satellite networks, as Southland Corporation enlists Ku-band satellite technology in managing its 350 distribution centers and 7,500 stores.

Ku Links 7-Eleven Stores

The rush to add Ku-band efficiency and cost-reduction benefits to corporate America may soon include about 7,500 7-Eleven stores.

Southland Corporation, Dallas, parent company of 7-Eleven stores, is developing its own national private satellite network for data and voice communications. The decision to develop a Ku-band PSN hinged on costs and greater operating efficiencies.

Bill McMinn, manager, voice and data communications, said Southland began looking for other communications alternatives well before federal courts forced the divestiture of AT&T. Divestiture, he said, was perceived as suggesting higher tariff rates via terrestrial lines.

"We looked for other ways to control our own data needs," McMinn said. "Ku-band was the newest technology for interactive terminal use for data."

About mid-1984, Southland tested the private satellite network concept by using a five-meter uplink at its Dallas headquarters, downlinked to a Florida site, where a M/A-Com 1.8-meter antenna was used. "We hooked them up to our IBM terminals and our response time was satisfactory," McMinn said, "and the bit error rate was excellent."

But Southland did not immediately move to seek FCC approval to construct its own satellite network. McMinn said antenna costs have been lowered, and now the project appears to be cost effective. Although he did not disclose the cost of the project, McMinn said M/A-Com has won the contract to provide the hardware.

Southland moves over a million transactions a day through 2,000 IBM terminals. The majority of the transactions are inventory related to sustain stock levels of 7-Eleven stores. About 357 district offices sup-

Southland Corporation, parent company of 7-Eleven stores, plans to have a satellite antenna on each store as part of its private satellite network for data and voice communications.

port 7,500 stores, five distribution centers and a dairy. The district stores are supported with private lines from the Dallas headquarters.

"We foresee a satellite dish on each 7-Eleven store," McMinn said. "The initial network will go to the district stores first. And in the next few years, possibly an antenna on each store.

"We are already placing automatic teller machines in each store. Right now, the ATMs are on the bank networks. I can see in the future that it'll come into our network, instead. It'll be cost effective for banks and ourselves. And we're looking at point-of-sale devices, check collection devices, that kind of thing. The check collection device would go into some network that does nothing but verify credit. All you would do is key in the driver's license and it would come back and tell you if they had good credit or not.

"The main benefit of a private satellite network versus AT&T's private data line are the facts: the bit error rate is better, actually error-free compared to terrestrial lines. And you can control your own destiny in pricing for the future. You don't have to worry about tariff increases, or tariff shock, as we call it. You have a fixed cost over "X" number of years that you lease or buy a transponder for, and then most importantly, you control the additions, deletions and moves of your network. In today's environment, if you have a district office that's going to move two-blocks away, you're looking at three or four months to get the phone company to move the line."

McMinn said Southland Corporation is negotiating with several firms about leasing transponder space. "The satellite we use will be Ku-band, but it will depend on who we work with. We're dealing with about five different firms and still negotiating with them." ■

Sales topped $105 million in 1985 for California Microwave, Inc.—not bad for a company which began in 1968 with $600,000. But the future looks even brighter. As the development of Ku-band technology continues, California Microwave plans to be a big part of the increasing world market.

Company Expansion Linked to Ku-band

by John Brannon

In 1968 about six California believers led by Dr. David Leeson pooled $600,000. To do so they mortgaged their homes and borrowed from families.

With that capital and a lot of faith, Dr. Leeson founded California Microwave, Inc., an electronics communications systems company that now serves a world market that is expanding rapidly with the development of Ku-band technology.

CMI designs, develops, manufactures and markets microwave communications products for commercial and defense applications. Included in the product line are C- and Ku-band microwave transmitting and receiving systems, computer-based monitor and control systems, satellite telephony equipment, digital transmission and microwave radio equipment. Sales in 1985 topped $105 million, reflecting more than a decade of innovations and firsts.

"One of the primary business areas that has been expanding the last few years is the Ku-band arena," said Walter Sharp, marketing director for Satellite Transmission Systems, a CMI subsidiary. "We see this as a market that has been growing and will continue to grow."

STS, located in Long Island, N. Y., is a major supplier of both C-band and Ku-band products, and is a pioneer in Ku technology.

Among major accomplishments of CMI and its subsidiaries are:

* first radar analyzers delivered to the Navy
* first synthesizers and converters developed for satellite earth stations
* Satcom converters used in the Washington-Moscow "hotline"
* flight line test equipment for radar used in F-4 fighter planes
* 120 satellite terminals for the Alaska bush network
* 400 small earth stations for Mutual Broadcasting Company
* selected by Citibank to construct a 10-station corporate satellite transmission network.

"We also built the Ku-band portion of

California Microwave KB Series System is a family of Ku-band digital earth stations that provides economical voice and data communications between the user's on-premises locations. Electronics equipment is mounted in a weathertight outdoor enclosure that attaches to the antenna.

the Sprint network, and the tracking telemetry command station got GTE-Spacenet, which controls their satellites in orbit," Sharp said.

One of STS's latest products in the Ku marketplace is SCAMP, or "Self-Contained Antenna Mounting Package," used for C- and Ku-bands communications. SCAMP is a small package component with a wide range of applications, one of which is the mobile environment of Satellite News Gathering.

"It's an RF package that mounts into the antenna itself, can interface at 70 MHz or 140 MHz, and will handle digital or analog video," Sharp said. "It's been developed as a digital earth station, but we expanded it to other applications. We are building this for corporate communications networks and other services. If a customer had a requirement to handle certain communications from his facility, we could put this in his parking lot. All he would see is an antenna out there. The upconverters, downconverters, LNAs, all are mounted in the antenna. The modulation equipment is all inside the building."

SCAMP can be used with antennas ranging in size from 3.5-meters to nine meters.

"We are seeing more and more activity in the Ku-band," Sharp said, "since it's easier to license when you come to the downtown area. A lot of people will be using it. I see quite a bit of growth in Ku. You'll see the home user have smaller antennas, and that should be more cost-effective. And we see the business-to-business expanding into the VSAT (very small aperture terminals) arena. That is an area that's going to rapidly expand—star networks—a major hub and a bunch of small remotes. We see more and more of these being built around the country."

Gary Vandemark, CMI general manager, said the divestiture of AT&T helped many telecommunications companies like CMI market their products on a more equitable basis. "It was done to create a competitive environment in all aspects of telecommunications," Vandemark said. "I think it has, in some respects, been

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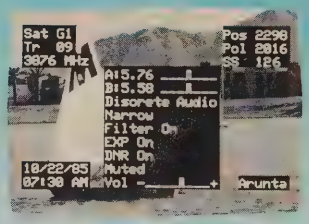

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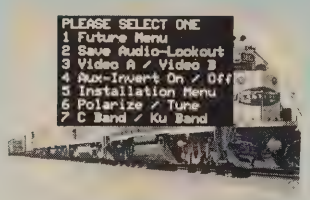
PLEASE SELECT ONE
1 Future Menu
2 Save Audio-Lockout
3 Video A / Video B
4 Aux-Invert On / Off
5 Installation Menu
6 Polarize / Tune
7 C Band / Ku Band

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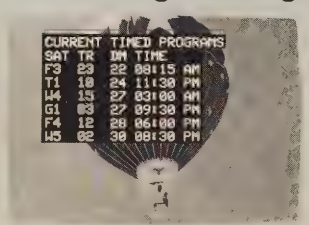

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- Audio Mute
- Audio tune meters
- Audio frequency displays
- Audio filter
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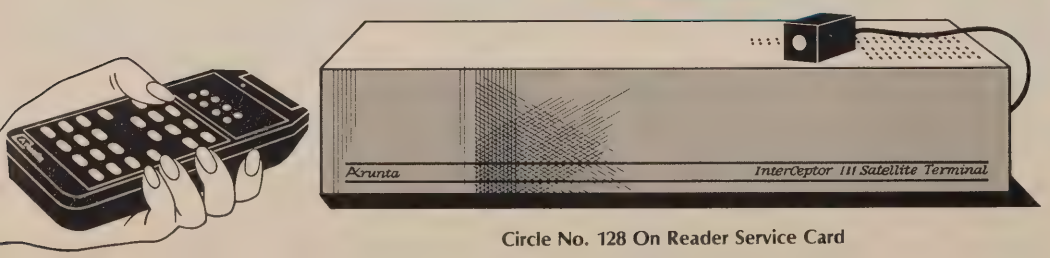

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very successful. It's taken a while to shake out, and there's still some more shaking out to do.

"Some of this revolution would have happened whether the phone company was broken up or not. At least, this now offers the vehicle for a company like us to sell directly to business, and that would not have happened were it not for the break-up. It opened the gates for companies to sell their products. Absolutely. What it did was take the monopoly portion out of telecommunications, and therefore there're no automatic assumptions made about who gets hardware. Companies have to get smarter; the phone companies have to get smarter. They have to worry more about costs than they used to because they're not subsidized by long distance service any more. Products made by companies have to stand on their own merits. I think that's very healthy for the industry."

Vandemark, who's been in satellite communications since the 1960s, said the industry's come a long way since IntelSat earth stations meant a five- or six-figure investment. "In the beginning, there was a lot of black magic to it because you had this 100-foot antenna and cryogenically cooled front ends on the receiver side. But eventually each of those pieces got replaced with simpler technology. GaAsFed (Galium Arsenide Field Effect Transistors) technology's made a great inroad into satellite systems. These days you can buy an LNA for a small dish for under $100. The old cryogenic amplifiers were $30,000 each."

He added that the C-band experience the past four or five years is a logical step in the development of Ku-band operations. Microwave hardware already existed for C-band, and it shared bands with terrestrial technology. "A lot of the first earth stations were nothing more than microwave line-of-sight radios with slightly different parameters, but not a major change." As satellite communications became more commonplace, and the need to transmit as well as receive by using small antennas increased, Ku-band was inevitable.

CMI's corporate quantum leap from obscurity to blue-chip status in less than 20 years has taken place under the leadership of managers like Leeson, CEO and chairman of the board, and Gilbert Johnson, president. "The whole idea of the company was that we would organize it and staff it in such a way that folks like Dave Hirshberg (STS president), could run their own businesses," Leeson said. "I'm more in the nature of a coach. Having played, I've made a lot of mistakes, but we're all learning at about the same rate."

CMI has several subsidiary companies and about 1,020 employees. "The theory of the organization is you can't have it unless you give it away, and it's the same thing with decentralization. You have to give people the opportunity to build their businesses."

Leeson has engineering degrees from several colleges and universities, and is a senior member of the Institute of Electrical and Electronics Engineers (IEEE). His love of electronics began early in life.

"When I was a kid, I fell in love with radios. I still remember my mother's friend whose son was a ham radio operator. They let me listen and I was thrilled to know you could hear something from somewhere far away. That was it: I was going to be in communications from that point on."

CMI's growth, he said, is exciting, and the company is in a position to expand further, bringing more subsidiaries into the corporate structure.

"We have a good base. We'll continue to have a mix of government and commercial business because of the things we know how to do.

"The opportunities for satellite are a result of the basic change in the way communications is going to be done in the future. The techniques that have been reserved in the past for long distance transmissions between major centers more and more are going to be applied directly to the premises: to the home and to the business. C-band TVRO is an example of that.

"Ku-band is an opportunity. Any time somebody opens a door there's got to be opportunity there; we try to pick the ones that fit our own skills best. Our first offerings were some large hub stations and smaller trunking stations, Ku-band integrated data systems aimed at trunking for the smaller networks. We've had some increasing opportunities to apply those in connection with the folks who are more specialized in the very small terminals. I think that's a trend that's going to continue, because the industry's going to go through a phase where it's strictly competitive and then a phase where everybody realizes they've staked out their territory, and a certain amount of cooperation is going to result in more business for everybody. I think we'll see that within the next three to five years." ■

MEDICOM '85: U.S., Soviet Doctors in Teleconference

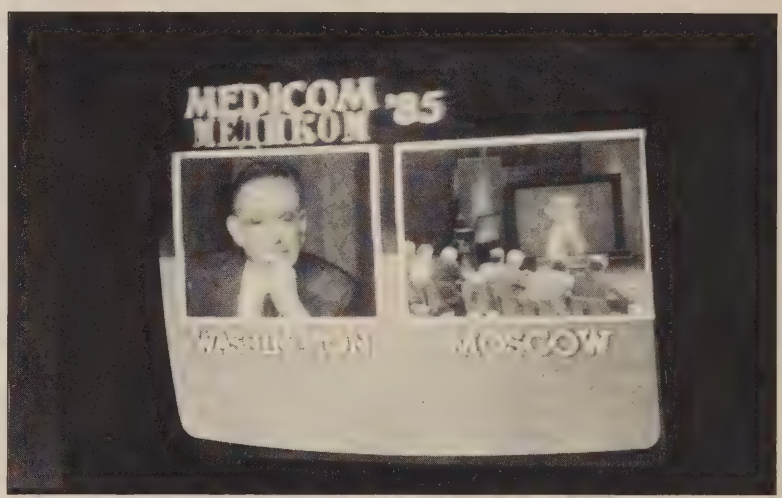
U.S. and Soviet heart specialists exchanged information on a number of subjects, including bypass surgery, during a historic two-hour satellite teleconference between Bethesda, Md., and Moscow recently. Dubbed MEDICOM '85, the meeting used the global television network of the U.S. Information Agency.

USIA Director Charles Wick said the conference was an outgrowth of the Geneva summit meeting between President Reagan and Soviet General Secretary Gorbachev.

"The exchange represents a new dynamic use of global satellite technology that we hope will enrich our ongoing dialogue with the Soviets in medical research," Wick said. "There is no better way to promote world peace than to share information that may save lives or cure diseases that now threaten mankind."

Phil Eames, director of news and current events, said USIA is attempting to use satellite communications to enhance and improve the dialogue that goes on between this country and other countries around the globe, including the Russians.

Eames said the Soviets do not use the term, "teleconference," but refer to it as a "space bridge."



U.S. and Soviet heart specialists participate in a satellite teleconference between Bethesda Md. and Moscow.

On the American side, uplinked from the Institute of National Health in Bethesda were six cardiologists including bypass surgery pioneer Dr. Michael DeBakey.

On the Soviet side were a similar group of noted Soviet medical specialists.

Topics discussed included the role fat plays in heart disease, a clinical discussion of coronary bypass surgery, and an update on how both countries are fighting coronary artery disease.

A mobile 18-wheeler broadcast TV unit at the NIH sent TV signals to USIA facilities in downtown Washington, which relayed them to Edam, W. Va., via AT&T circuits. From Edam, the next link was to the Atlantic primary satellite, downlinked to the Dubna earth station in the USSR, and from there via circuits to Moscow. A return circuit from Moscow to the USSR L'Vov earth station to an Indian Ocean satellite, down to the earth station in Reisting, West Germany, where the Russian signal was converted from C-KAM to the American NTSC standard. From Reisting the signal went to the Atlantic major path II satellite, and from there to the Edam COMSAT earth station, back to Washington and Bethesda. ■

Satellites Link World Press

Live international press conferences from Washington to U.S. embassies throughout the world via C- and Ku-band satellites are giving foreign journalists direct access to President Reagan and other top level U.S. officials.

Dubbed "WorldNet," the service was established by the United States Information Agency, Washington, in November 1983, immediately after U.S. troops foiled a Marxist take-over of the Caribbean island of Grenada. It has been used about 160 times since then to 80 different countries.

The first WorldNet press conference featured U.S. Ambassador Jean Kirkpatrick in New York, two Caribbean prime ministers in Barbados, two assistant U.S. Secretaries of State, with over 40 journalists in eight European countries. In each instance, foreign journalists are invited to U.S. embassies where large-screen video presentations of featured speakers are coupled with two-way audio. Interpreters are furnished for these events.

Reinkins said WorldNet uses a variety of satellites, such as IntelSat and ComSat, for the press conferences. U.S.I.A. also uses the ECS 1 (European Communications Satellite-One) for its daily two-hour TV program, "America Today," beamed to about 30 TVRO antennas at U.S. diplomatic posts in western Europe. "In the east beam, which is footprinted all through eastern Europe, anybody who has a dish there or in western Europe are free to take the signal and listen and look at the show," Reinkins said. "This is a kind of Voice of America with pictures."

U.S.I.A. also uses Reagan's domestic news conferences for WorldNet transmission. A videotape of the entire press conference is often broadcast.

"The payoff for us is that we hope these broadcasts will receive major attention as news items on the evening or afternoon news and be repeated several times overseas," Reinkins said. "It's also used for public affairs programming and for documentaries. A country in Africa might run the entire show. But the BBC may run only three minutes of it. The payoff is it's handled as a news show. We've had broadcasts to 80 countries around the world. When we go to Africa, we go out in French and English; to Latin America, it's English and Spanish; if it's to the Middle East, it's in Arabic and English."

Reinkins said the Soviets have been very critical of WorldNet because it "put high American foreign policy officials in direct contact with journalists and opinion formulators overseas. The journalists have a chance to bridge time and distance and ask direct questions of these officials here in Washington."

Because WorldNet is delivered via satellite, any location may be used, as when the U.S. Congress took testimony live via satellite in June 1985 using facilities at studios in Panama. The occasion was congressional interest in an international education exchange bill.

Reinkins said WorldNet could be used in times of international crisis, but he doesn't think it will replace the Hot Line between Washington and Moscow. "It's not really for that kind of diplomacy. The Hot Line is encrypted, and WorldNet is in the clear. U.S.I.A. is involved in public diplomacy explaining America overseas. What we try to do is get as much public exposure for our people in our programming as we can." ■

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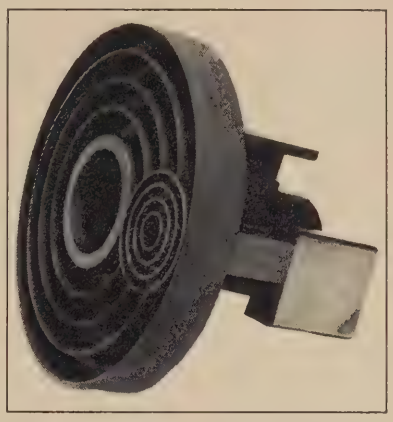

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Ku-band Installation Tips

A Texas TVRO dealer has installed Ku-band systems and he's willing to pass along a few tips to others.

Dallas Yenawine, owner of Dal-Yen Systems, Leander, Texas, has a very positive attitude about Ku-band and its potential for additional marketplace opportunities and programming.

Yenawine's first tip is "make absolutely sure the Ku-band feedhorn is centered in the vertical plane and put guy wires on it. No matter what you've got, put guy wires on it."

There's a slight problem, he adds, with the printed instructions that come with some dual feeds.

"They say put it on the existing C-band feedhorn, and leave the C-band feedhorn in the center. I found that by placing the Ku-band feedhorn closer to the center, it made a dramatic improvement in Ku-band performance. C-band performance was affected very, very little—practically not at all."

The closer the Ku-band feedhorn is situated on the center of the antenna, the better quality TV picture?

"Yes. It's dramatic. But deep dishes are not ideal. Ideally, if I were going to set up a Ku-band system from scratch, I'd use a shallow dish, preferably a six-footer, because you won't have quite as much effect by moving the feedhorn from side to side."

Yenawine also urges Ku installers to "make sure the feedhorns are lined up horizontally and vertically, and lined up with each other as perfectly as you can get them horizontally. Then go through and re-arc the dish on the Ku-band signals. You're going to find that the C-band still looks good, and probably better than it was before."

Leander is located about 20 miles north of Austin. Yenawine established his TVRO business in mid-1984 and did fairly well on his own and by installing systems for other area dealers—until the bottom fell out of the market.

"In December we started getting some really terrible press in Austin, mainly from the television stations. They said a lot of things about the scrambling matter, how people were going to have to have a dozen descrambling devices. Well, that just about shut the city down, satellite-wise. That was dirty pool. Satellite sales dropped dramatically for the dealers I worked for.

"Before the bad press, Austin Home Satellite averaged selling about 20 systems a month. They'd been doing that for about two years. After the ad campaign by apparently somebody with clout, sales dropped dramatically to about six systems a month. But it's starting to pick up again. What the bad press did was put a lot of questions in people's minds, and they had to get answers to those questions before they would start shopping again. Now they're starting to come back."

A couple of Yenawine's long-time customers were avid sports fans. When NBC moved its feeds to Ku-band, they called him for help. "They couldn't get their football games," Yenawine said. "One man was desperate; said he wanted me to get him a Ku-band system as soon as they came out."

Yenawine located some DX Ku-band components and called his customer. That installation was a dual C-/Ku-band system using the customer's Prodlin antenna with a Houston Tracker IV actuator. Yenawine installed a DX Ku-band feedhorn alongside the existing C-band feed, and installed a DX600 receiver, too.

Another customer called and told Yenawine, "I've got my Ku-band system. Now you come put it in for me." Yenawine found the customer had purchased the Ku-band components, and wanted his Winegard antenna reconfigured for Ku-band capabilities. He, too, was a sports fan. As with the other installation, Ku-band feedhorns figured prominently in the installation.

"Right now, we have to deal with a compromise situation when we're using dual feeds," Yenawine said. "They're not concentric yet, but side-by-side." He said he's not been able to obtain the popular Chaparral "Shotgun" feed, nor a Seavey feed.

Yenawine recommends that consumers use two antennas, one for C-band and another for Ku-band. A 6-foot Ku-band antenna should be adequate. "It doesn't cost that much for a good 6-foot Ku-band dish," Yenawine said. "It's not that expensive. The feedhorn's the biggest expense and you're going to have to buy that, anyway.

"I recommend two different dishes for the same reason that I like block downconversion systems. Usually the guy who wants a Ku-band system is a sports freak, and he's going to be watching football or something all day. The other members of the family probably want to watch something else."

Another reason, he said, is the smaller Ku-band antenna would require an inexpensive actuator such as the Drake APF24. "I wouldn't put any more than a digital actuator on it. I'm sure the customer would be very satisfied. Some of the C-band dishes have actuators that have just too much 'slop' in them for the precision required by Ku-band."

Yenawine said he could sell and install a Ku-band system—a 6-foot antenna with a Drake APF24 tracker, a DX600 receiver and a DX Ku-band feedhorn—for about $1,500 and for reconfiguring a C-band antenna, about $700. ■

PREMIUM SERVICE FEES COMING DOWN

Scrambling of premium television services is certain to bring down the price for satellite-direct-to-home services. And, there's growing support for scrambling among both users and providers of services and equipment as it becomes clear that competition and perhaps litigation will result in reasonable fees for both Ku and C-band services for home TVRO.

Showtime officials will announce scrambling plans shortly and clearly the service plans to compete with HBO in the price arena. C-band TVRO leaders are now saying scrambling may be a blessing and that once price and access issues are settled, sales will skyrocket for Ku and C-bands TVRO.

Hearings on the concerns of program suppliers, cable owners and TVRO are scheduled in the Congress for March. Some observers see cable officials more than hesitant about the hearings which are likely to reveal pressures applied to programmers to scramble that may not be entirely within the context of fair business practices.

NEW KU PRODUCTS RUSHED TO MARKET

Interest and demand for Ku products among home TVRO consumers has far outstriped supply. Major manufacturers who were first in the market with key components, particularly dual C/Ku feed systems are facing pleasantly large backorder demands. More than a dozen manufacturers are rushing to market products to meet the demands. One such company is National RDL Enterprises which has produced a Ku dual polarity feed and a dual C/Ku-band feed with builtin TI screens.

SHOWTIME SHIPS DECODERS

Showtime has shipped to affiliates about 6,800 decoders, the same VideoCipher II used by HBO. Showtime will launch a strong marketing plan for TVRO this spring but in the meantime expects to collect a windfall of new fees from commercial pirates among cable groups and illegal SMATV systems, bars, etc. Showtime will offer more than movies to home owners. Data services will be in the offering that will also include Ku-band.

DRAKE INTRODUCES KU RECEIVER

R. L. Drake Company, long one of the standards among TVRO receiver manufacturers, has introduced a new Ku-band receiver. The unit is an improved version of its top of the line C-band system. Drake joins other major players in the move to position sales to take advantage of Ku's growth which most observers forecast will be highly significant by fall.

VIDEOTEXT POISED FOR GROWTH

Videotext services will be a major market for business and home before the end of the decade. A study by Frost and Sullivan projects the current business videotext market of about $30 million to reach the $1.5 billion level by 1990. A wide variety of pilot projects and strong activity on the part of vendors to package videotext hardware and software are seen tracking development of videotext.

CABLE BEGINS TVRO SALES

Cox Cable and Jones Intercable have joined TCI, Heritage Communications and a host of other MSO's moving into TVRO sales. TCI, the largest cable MSO, announced a TVRO package that includes a $6 monthly initialization fee, and an additional $6 for a basic package of about 10 channels and $10 for HBO. A second movie channel would be available for $6.50. Cox is selling the VideoCipher to TVRO consumers for $375 and will charge $10 for HBO and/or two premium services for $18.

Many observers see cable and TVRO dealers merging their interests with cable owners making their money from fees and the dealer profiting from the sale and maintenance of equipment. The partnership may be a good working relationship that will carry over into Ku-band as Ku DBS becomes a reality.

Having trouble finding Ku-band products? You are not alone. It's true there is some confusion in the TVRO distribution chain of Ku-band equipment, but the industry is quickly sorting itself out; within six months the Ku-band marketplace should be on track.

The Evolving Ku Market

by John Brannon

As restless as dry leaves in an Autumn thunderstorm.

That's how some dealers and distributors describe the chaotic state of Ku-band products in the TVRO distribution chain, from manufacturer to consumer.

At the center of the tempest are antennas, feedhorns and receivers, and in a lesser sense, LNBs and actuators.

Very few persons contacted doubt the benefits and feasibility of Ku-band potential for both home television programming and business communications. Problem is, how do you get there from here? As an Illinois couple learned, it's easier said than done.

Carol Gurley had her heart set on buying her husband, Chester, a Ku-band TVRO system. Chester is a coalminer who enjoys satellite TV programming for relaxation. The Gurleys, who live near Carterville, Ill., have owned a C-band TVRO system two years. Recently they decided to upgrade it to a Ku-band system.

"I've been trying to get him a Ku-band system since November for Christmas, his birthday, and our anniversary, all of which fall within a two-week period," Carol said, "and I still haven't found one. He thought I'd found it at Christmas because I had placed a big wrapped box under the Christmas tree, but it was a coat. He was disappointed when he opened it."

Chester contacted several local TVRO dealers and discount satellite centers about Ku-band equipment, but ran into a host of blank stares. "Don't have it in stock; there's no demand for it," they told him. Chester said he found he knew more about Ku-band than most dealers because he subscribes to industry magazines, which is how he became interested in Ku-band programming in the first place. "Watching TV is more than just a hobby with me," Chester said. "I like to keep up with what's up there and what's going on."

But the unsettled nature of the Ku-band product marketplace won't last long, a Midwest distributor predicts.

"It will be startling what will happen in the next six months," said Lee Taylor, general manager, Recreation Sports and Imports, Inc., Idaho Falls, Idaho. "When we started out in 1981, dealers were in about the same boat as we were—very immature and enthusiasts—as opposed to being business people. As we all grew up out of the

enthusiast era, we've all become business people. We're a lot more sophisticated than we were back then, and we have better equipment, better shops, better everything. And we have more knowledge available to us. Within six months you'll see a startling difference from what there is on the marketplace right now."

Another distributor who prefers not to be identified, said most of the product confusion may be directly attributed to the concept of using C-band antennas for Ku-band reception.

"We've had very knowledgeable people come in here and spend a whole day with us, show us the reason Ku-band will or will not work," he said. "We have a Ku-band system, a 4½-foot dish with offset feed. No problem, works like a charm. You can have Ku-band programming if you have a Ku-band system—period. But there're drawbacks to having Ku-band and C-band simultaneously on C-band equipment.

"All these antennas being marketed today are C-band antennas. They were not designed for, nor engineered for, nor intended to be Ku-band antennas. Sometimes they work. But when they do, it's a plus at no extra cost.

"We want to market Ku-band. We're carrying Ku-band equipment now. There're DX and Panasonic, but the problem is to make everything work like it's supposed to on an antenna that's designed for C-band. We're finding there're real problems with Ku-band on C-band equipment."

But two highly respected sources have another point of view.

Taylor Howard of Chaparral Communications said, "Every mesh dish I've tested has worked well at Ku-band." John Seavey, president of Seavey Engineering, said, "Successful operation of a TVRO installation is being done every day by relatively simple modifications of standard C-band equipment."

But the distributor is not convinced . . . not yet, anyway. "The dealers and their customers want answers, and honestly, we don't have all the answers. It seems like the burden is falling on the distributor to determine whether the equipment will work properly. I'd like to see the manufacturer do something along this line. They may have a reason for not doing it, and I'd like to know what it is.

"Please don't misunderstand me. I don't fault the manufacturer. If I designed an automobile or a tool, anything, to do a particular thing, then I would be very reluctant to represent that product to do something that it wasn't designed for.

"The ideal situation right now, if you want Ku-band programming, is to buy a Ku-band system, all designed to be fixed on one satellite and use only one polarity. But that's not what Ku-band was meant to be. We think it's coming in a year or so.

"There's great interest in Ku-band, no question about it. The Ku-band equipment for C-band antennas just is not available to us the way it needs to be."

Gary Friest, sales manager, Continental Satellite Systems, Clackamus, Ore., said the Ku-band marketplace may be compared to a phenomenon he has noticed lately. Many radio stations are advertising their AM programming being broadcast in stereo. But shop around and try to find an AM stereo radio, he said. "I think the Ku-band problem is basically in the same stage."

But while the Ku-band market works its transition from "that stage," manufacturers are re-tooling production for the more precise demands of 12 GHz communications. But not overnight. Those manufacturers who have established an enviable track record and solid reputation for their wares jealously guard their accomplishments, and hesitate to be rushed by marketplace fever into fielding anything less than a high quality product. Hence, superior Ku-band products may not appear on the market until having run the exacting testing required by sharp engineers who've done their homework.

Winegard Company, Burlington, Iowa, is a manufacturer making adjustments. Its traditional line of 6-, 8-, and 10-foot perforated antennas are well known and have achieved a decent share of the antenna market. For C-band reception, they feature surface holes 5/32-inch in diameter. Ku-band has made a virtue of necessity for Winegard.

"We are converting those antennas over to 5/64-inch holes, and they will be Ku-band compatible," said Gil Cunningham, communications manager. "Just a little smaller than usual."

It has been widely recommended that perforated Ku-band antennas have surface holes not larger than 1/10-inch, "but our engineers feel that 5/64-inch is probably most efficient for our purposes. This new hole size still maintains the same amount of open space per square inch—36 percent. There are more holes obviously per square inch, but the actual open space is the same. From a wind-loading standpoint, the antenna is very similar to our current line of antennas."

Taking adjustment even further, Winegard is developing a special Ku-band antenna, a 1.2-meter perforated aluminum featuring 5/64-inch holes. "We're going to introduce it once the Ku-band market starts to develop," Cunningham said. "We don't think Ku is a hot market right now, but it certainly will be. We will be introducing antennas specifically for Ku-band.

"We think this Ku-band antenna is going to be the best in the see-through category. The specifications on it are very tight, and the tolerance is very tight. That's something that we stressed, and surface tolerance is very important for Ku-band. On this antenna, it's plus or minus .015."

Winegard will eventually expand to include electronics for its antennas, "but the antenna is something we worked on a long time, and we're going to get that product out on the marketplace first."

Cunningham attributes Ku-band TVRO marketplace confusions to the TVRO industry itself, noting that some antennas touted to be Ku-band compatible may not be at all. "There are some out there with hole sizes much larger than 1/10-inch, and some of those people are claiming their antennas will work well at Ku-band. We just don't think that's correct.

"Ku-band is going to be a big market, and we've already seen a lot of movement in that direction. Winegard plans to establish itself as a major supplier of Ku-band antennas."

And "major supplier" includes the business communications marketplace, as well, he said.

"There is not enough Ku-band equipment available, and what there is, is really expensive," said RSI's Lee Taylor. "You can't get feedhorns on a timely basis, and occasionally there are some LNBs. Ku-band receivers are difficult to set up at best, and there's not a lot of information in the marketplace about them. This Ku thing is just exactly the way it was when C-band first started."

C. L. Carlile, president, Starcom Distributing Co., Inc., Big Spring, Texas, has similar thoughts. "We're not able to get much Ku-band equipment right now," Carlile said. "We've got it on order, but supplies have been very limited. We can get receivers and buy dishes that'll work, but the feed assembly is still in the experimental stage and not adequate to work properly. It leaves something to be desired unless you go with a separate antenna just for Ku. If you're trying to do a combination, it's still not perfected and not in sufficient quantities. That's our experience so far, but I think they'll work it out."

A Louisiana dealer tells of his experience with Ku-band products. "Our opinion is that it's just too early," said Ben Bickham, Satellite Solution, Hammond, La. "The availability of equipment is typical to what we saw in C-band five years ago. If you want to change an LNB or something, you've got to switch the whole thing. I think we'll see some Ku activity, and obviously that's where the industry's looking. We need a better pricing arrangement, too, because what is available right now is too high."

Continental Satellite's Gary Friest said, "I think both Ku- and C-band antennas demand prime focus feeds. When you're trying to use one antenna to achieve two principles, it's like taking a UHF antenna and trying to get both UHF and VHF on the same one without making modifications to the antenna.

"Both C-band and Ku-band, to get optimum performance out of the electronics and the antenna, require prime focus."

RSI's Taylor noted that the unsettled nature of the market right now may not be all bad, that some unsightly debris may be swept away in the process. "The marketplace will become so sophisticated and so competitive that the guy selling out of his pocket and backyard will, as happened in boats and snowmobiles and motorcycles, go away, by his own natural attribution. There are some things we could do to hurry his departure, but it's like the story about the common cold: If you doctor it and take care of it and go to bed, it goes away in seven days. And if you don't do anything, it goes away in a week.

"So, this last year, as compared to where the industry is right now, the marketplace has cleaned up a lot." ■

Business TV Eliminates Travel

Sales seminars and other meeting-of-the-minds events between many parties in different parts of the country won't require any airline tickets or packing the bags in a scenario of today's modern business television services.

Simply go to the conference room, dim the lights, watch a big-screen presentation downlinked from a Ku-band satellite, then phone in your questions to the host, who answers them on the air.

Richard Neustadt, senior vice president and general counsel, Private Satellite Network, said the scenario is only one of many uses of Ku-band satellite telecommunications. Neustadt prefers the term business television for such applications of high-tech satellite commercial use instead of video-conferencing, which he says causes confusion. "I use that term (video-conferencing) to describe both point-to-point digital two-way systems, and point-to-multipoint analog broadcast systems," Neustadt said.

PSN markets private internal television network services to large organizations around the country. Neustadt gave another example of business TV.

"A company that has offices scattered around the U.S. can use one of these systems to broadcast live TV out to its people," he said. "Receive antennas are installed on-premise so people won't have to go anywhere to physically participate in the programs. PSN is operating these networks for a range of large corporations in the U.S. and Canada and soon will be sending this service overseas. We also operate a similar training program for lawyers, and we just launched a service called Institutional Research Network, which is a private television network designed for institutional money managers. We have upwards of 400 Ku-band systems in operation today, which I guess makes us the largest Ku-band network in the United States."

Neustadt used the occasion of a Scientific-Atlanta luncheon in a posh New Orleans home to announce PSN's choice of the B-MAC encryption system to provide privacy and security to its business TV broadcasts. "We decided to adopt the B-MAC system for some of our customers because of specific requirements they have," Neustadt said. He said B-MAC was especially desirable because it offered not only private TV, but also superior voice and data services.

Two customers of PSN are Microwave Computer Stores and Merrill-Lynch. MCS has a chain of computer stores across the country, and Merrill-Lynch has about 500 locations in the U.S. and Canada.

"Merrill-Lynch will be taking voice and data traffic and transmitting terrestrially to its offices, integrating those with video, using them in that format, transmitting a whole package down into a single antenna for use in its appropriate offices," Neustadt said.

"B-MAC has the capability of handling not only video, but also separate, individually addressable voice and data channels. We're very excited about the potential of that combination in serving a variety of customers."

Separate voice and data channels affords the user the capability of using a transponder more efficiently; "Transmit television to one customer, transmit voice or data to another, and keep the two separate over the same transponder and protect the security of all the different transmissions," Neustadt said. "From my point of view, scrambling is a very secure system." ■

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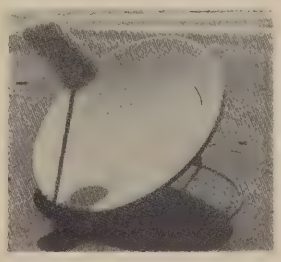

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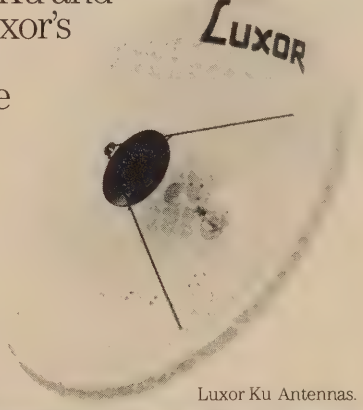

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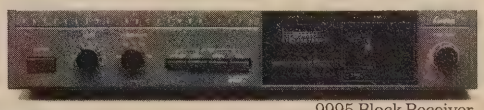

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The promise of Ku-band DBS in the early 1980s drifted into limbo and the industry faded in the light of C-band technology. Now Kaul-Tronics' president John Kaul predicts Ku-band will be the wave of the future and he plans to be in the forefront of the technology.

Kaul-Tronics Keen On Ku-band Market

by Joseph Koelsch

If you heard it once, you probably heard it a thousand times as you were growing up: "You must learn to be patient. Everything comes in due time."

That's how it seems to be with Ku-band acceptance in the satellite TV industry. After a bright start earlier in the 1980s, Ku-band drifted off into limbo, largely ignored by an industry which was full-speed-ahead in C-band technology.

But now, as 1986 comes storming in, things are decidedly different. "Ku-band will be the wave of the future and Kaul-Tronics plans to be in the forefront of the new technology." That prediction comes from Kaul-Tronics president John Kaul.

As head of a company which started in 1980 with one employee and now totals 160 plus, Kaul finds it difficult to play down his enthusiasm.

"We hope to be shipping Ku-band antennas in the first quarter of the year," he says confidently.

Kaul-Tronics, a manufacturer of stainless steel solid antennas as well as a family of mesh reflectors, is based in Richland Center, Wis. where research and development is going full scale in the bitter winter weather of the upper midwest.

Rudy Marshall, heading up the Research and Development division of the firm, discusses Ku-band with more emotional control. But there's still fire in his eyes when he tells about the work he and his staff are doing.

"We're currently working with several dual feeds that will pick up both 12 GHz and 4 GHz signals on the same reflector. We have three reflectors now that will be accepting the 12 GHz range. They're the Nova series of stainless steel dishes at 112-inches, 90-inches and 66-inches, "Marshall explains.

Kaul-Tronics' personnel are heartened by reports coming from the industry on the effectiveness of the stainless steel series in accepting Ku-band signals.

Joseph Koelsch is director of public relations for Kaul-Tronics.

Typical is the finding of Mark Long, author of the 1985 *World Satellite Almanac,* who tested the SS 112 and the SS 90 antennas. He indicated that they were the most efficient reflectors he has tested for Ku and C-bands compatibility.

Since the stainless steel antennas are hydroformed and the hydroforming process yields a highly accurate parabolic surface and both of those reflectors have been extensively field tested over their four years of production, Long's results were expected. But they were nonetheless gratifying in having them confirmed by an independent testing source.

Kaul-Tronics is not putting all its eggs in the stainless steel basket, however. As Marshall puts it, "We're also looking at an aluminum hydroformed prototype that would be smaller in size, probably three to four feet. We're also working with mesh reflectors and have tested some of our larger mesh dishes with success on the NBC feeds of SBS III."

There are also other things on the drawing board, according to Marshall. "We're designing one that will be primarily a Ku-band reflector but which will also be compatible with C-band."

Marshall likes to keep things in perspective. He ticks off some of the known disadvantages of Ku-band. "For one thing, a marginal dish just will not work with 12 GHz as it will in the 4 GHz range. Then there are the known problems with atmospherics, things like clouds, rain and any other moisture because of the higher frequency."

But with the disadvantages taken care of, Marshall turns readily to the overwhelming advantages of Ku-band: "As more programming is added for viewers, it will give us a real potential for closer satellite spacing, as close as one-degree. That will effectively double the number of satellites available," Marshall explains.

The R and D head sees the potential of alternating 4 GHz and 12 GHz satellites in orbit, using different uplink and downlink frequencies.

"It's a real possibility and there'd be very little interference. But remember, this is just a personal observation. You know, we have just a comparatively small space up there in the belt that we can use, we Americans and Canadians. Obviously doubling the number of potential satellites and transponders would be a tremendous asset."

Another member of the R and D team at Kaul-Tronics is technical engineer Dale Davenport.

"We're really intensifying our Ku-band research. We're exploring different avenues to make our current antennas more compatible with 12 GHz," he explains.

Davenport and his crew of technicians have built their own downconverter to enable them to monitor 12 GHz transponder signals while using a standard Hewlett-Packard power meter. It also allows them to monitor the performance of the present C-band products.

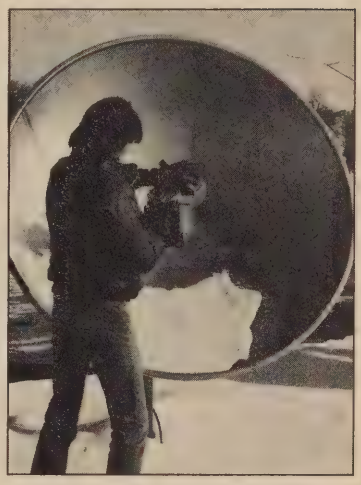
"We have found that high parabolic accuracy is an absolute must," Davenport explains. "We want to be on top of this industry so we are intensifying our R and D in this field."

Davenport takes a lot of pleasure in being able to answer the frequent questions that come in from around the country regarding Ku-band.

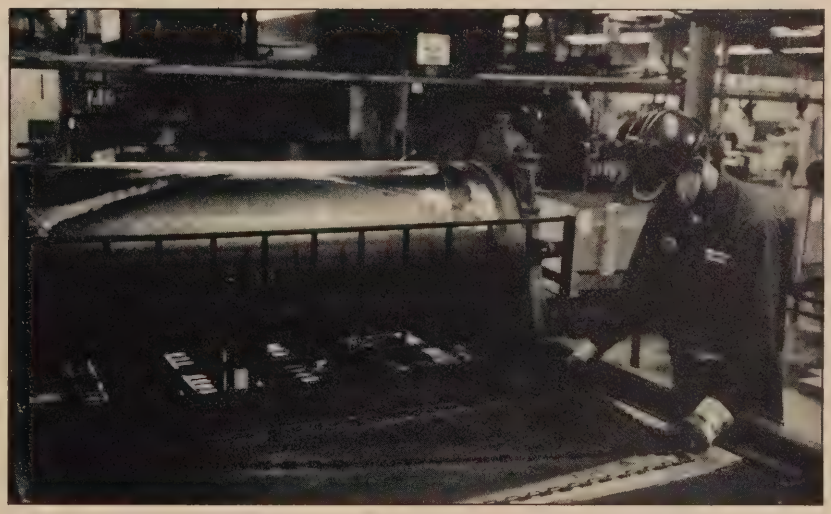
"We get a lot of comments that we're the first people they've contacted who seem to be on top of this field, who really know some of the answers. It makes us feel good, that we're doing the job. We want to be leaders because we know it's going to be terribly important.

"Here's this 12 GHz technology that encounters no real interference problems compared with the terrestrial and other interference which is experienced at times with 4 GHz."

The Kaul-Tronics team sees the potential of sharply expanded programming and a delivery system on smaller antennas that will help the industry reach the 35 million-plus households that are still to be serviced in this country. ■



A technician checks a dual feed on a Kaul-Tronics 66-inch stainless steel antenna during testing in the sub-zero midwest winter.



A workman adjusts mesh in panel cutting machine at the Kaul-Tronics plant.

With an alert sense of marketplace conditions, Bob Mullenax established Certified Industries, Inc. to produce mesh antennas. Immediate popularity of the Battlestar proved he was right, and Certified is hot on the heels of a good share of the TVRO antenna market.

Antenna Manufacturer Gears Up For Ku-Market

by John Brannon

As the home TVRO market clocked a billion dollars last year the trend clearly included a swing to mesh antennas.

With the arrival of Ku-band manufacturers of both solid and mesh antennas are taking a second look at manufacturing materials with some convinced that solid antennas are superior and others questioning that superiority, especially when the marketplace reflects a preference for the more cosmetically attractive mesh antenna.

Bob Mullenax, president of Certified Industries in Searcy, Ark., is typical of industry leaders who have strong experience in manufacturing both mesh and solid antennas. The growth of Certified from $60,000 in sales in March to $1.2 million in November parallels the growth of mesh in home TVRO and now Certified has set its sights on the developing Ku-band market.

Mullenax has a stock response to claims that only solid antennas need apply for Ku TVRO opportunities.

"Humbug," he growls.

Then he tells you about Columbia.

Not the space shuttle, but the antenna. Not just any antenna, but one especially produced by Certified Industries for Ku-band home entertainment TV programming.

Columbia is a 10½-foot, four-piece aluminum mesh antenna that has been on the market since Labor Day.

"It can be assembled with the mount and feed system in less than 30 minutes by one person," Mullenax said. "We figured that if we could build a mesh antenna the way we used to build a solid antenna, except for the weight, then all you've got is about 36 screws to put it together.

"It was really very easy. I put one antenna up against the other, and myself in the position of the dealer. No doubt about it—a mesh antenna is more cosmetically appealing than a great big egg sitting out in your backyard. Also, if it's built properly, a mesh antenna will perform right alongside a solid antenna.

"But the main thing about it is it's so easy to assemble because it weighs less than a third of a fiberglass antenna. It takes two or three people to put a fiberglass antenna together and get it up on a mount. It's just the nature of a fiberglass antenna: heavy. One person can lift the Columbia and put it on the mount. It's all aluminum, weighs 50 pounds."

Specifications of the Columbia are:

F-to-D ratio:	.375
Focal point:	45 inches
Gain:	40.3 dB
Gauge aluminum:	
Size of holes:	

Mullenax noticed a marketplace trend toward a preference for mesh antennas in 1984. He believed that mesh might one day dominate the antenna mar-

ket. At the same time, he learned that a machine shop that produced antenna mounts could be acquired.

"So I'm sitting here watching them, and the demand for a mesh antenna grows," he said. "And we had an excellent relationship with people who had 20 or 30 years of military machining experience; all the tools and everything we needed. That's how it fell into place."

He and other investors established Certified Industries, Inc., at Cabot, Ark., in January 1985. The principal stockholders and company officers are Mullenax, president; Eddie Duke, national sales manager; J. R. Knowlton, general manager; and Joe Lorenz, in charge of purchasing.

Certified Industries currently builds the Columbia antenna, as well as the Discovery, a 12-foot black steel mesh; the Battlestar, a 10-foot steel mesh; a 6-foot aluminum mesh, a 6½-foot steel mesh, and a 12-foot aluminum antenna.

June 1985 was the month when mesh antennas seemingly became the preferred antenna for TVRO consumers.

"That's when we built the Battlestar," said Mullenax. "The distributors loved it. We shipped three and four truckloads a day; couldn't build enough throughout the summer. I knew right then that our hunch about the mesh antenna was right on track."

Certified Industries grew rapidly, and moved from its several locations at Cabot, Ark., to a larger facility at Searcy last fall. Mullenax said the company employs about 200 workers, making it the third largest employer in the city of 15,000. Plans are underway for a springtime expansion of present facilities.

Certified Industries produces an offset mount for its antennas. Made of steel, the mount has horizon-to-horizon capability, and can use the same actuator as used for C-band antennas. (The Columbia antenna is designed for use at both C- and Ku-bands.) Offset means the antenna is still centered on the mount ring, but the back part of the mount is offset of the ring.

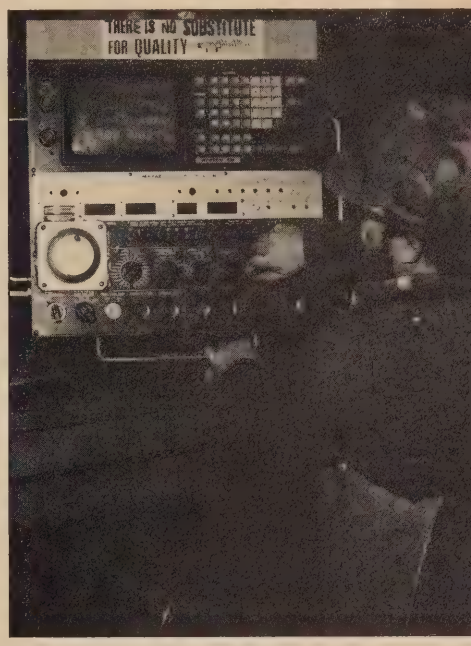
"The offset mount was designed for optimum operating conditions at Ku-band to eliminate 'slop'," said J. R. Knowlton, general manager. "For example, at C-band, in rotating the antenna on its horizontal axis, when you get over to F4 satellite, and your boom gets parallel with your mount head, you've got about an inch of slack there. With our offset mount, we have eliminated that. With the jack loaded at all times you don't have that slop. At Ku-band, you've got to have more precise tracking of the satellites, or you'll run right by them."

Knowlton said Certified will market a Ku-band feedhorn under a special label.

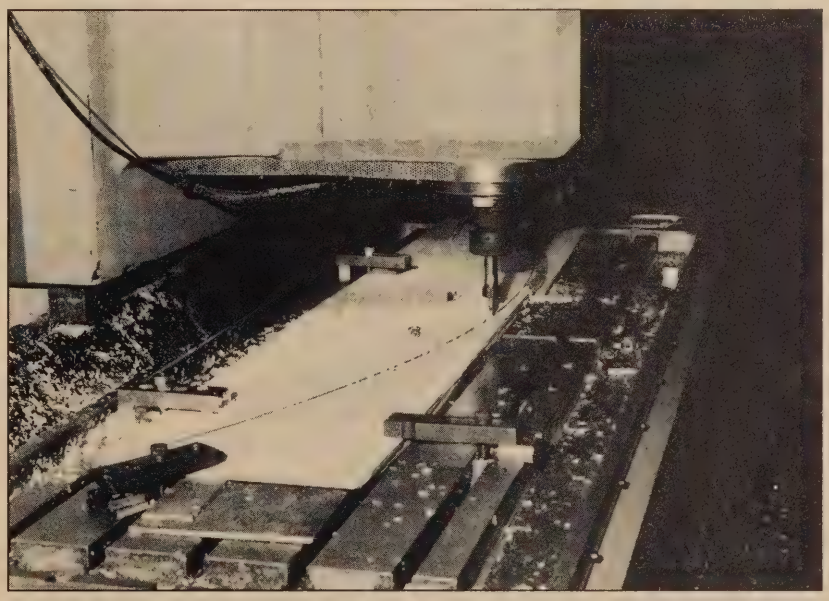
"What we're trying to do here at Certified Industries is listen to distributors and dealers as to what improvements products should have," Knowlton said. "The mount and feed are designed to fit the antenna. It all goes together very simply and easily. That is what the distributors want to give to their dealers. A dealer doesn't want to be in somebody's backyard for hours putting an antenna together. They do want to be able to do the job in about 30 minutes; put the thing up, get it on the air, and get on to the next job. That's what we've been able to provide."

At two recent gatherings at a hunting lodge in Gillette, Ark., Certified Industries demonstrated the Columbia antenna to distributors and dealers. Mullenax equipped the system with the Columbia, a DX6000 receiver, a Panasonic LNB, and the Chaparral 12-GHz-only feedhorn. Then he tuned the system to Ku-band programming, much to the amazement of skeptics in the audiences.

"They couldn't believe the brilliance of the picture quality," Mullenax said. "Maybe they figured only a solid antenna could do that." ■



A Mazak computerized milling machine cuts a parabolic curve pattern for a 10½ foot antenna at Certified Industries, Inc.



The computerized milling machine is controlled by a worker who keeps close watch over the cutting operations.

As more and more programming moves to Ku-band, the demand for information on Ku equipment increases. Engineer Tim Cummuta examines the different types of antennas available and explains the criteria for operation at 12 GHz.

Antennas: Meeting Criteria For Change

by Timothy Cummuta

The march of technology has historically meant smaller and better products, and the advent of Ku-band is no exception. Smaller products, better quality and expanded applications for satellite communications are a part of Ku's future.

For the home consumer of satellite programming, the nightly fare will gradually move from C-band to a combination of C-band and Ku-band. As a result, new reflectors and other products will change the face of the TVRO Home entertainment marketplace.

The movement to Ku dictates a re-examination of the different types of reflectors as well as the criteria for operation at 12 GHz compared to those considered standard for 4 GHz. These criteria include:

Gain
F/D Ratio
Efficiency
Beamwidth.

The formula for gain of a reflector is:

$$G = K\left(\pi \times \frac{\text{diameter}}{\text{wavelength}}\right)^2.$$

In this formula, G = gain, K = efficiency, diameter = the useable reflective surface (straight across the surface), wavelength = the wavelength of the frequency of operation and π = pi, which equals 3.14.

Examining this formula, it's apparent that increasing the size of the reflector will increase the gain. It is also discernible that a decrease in the size of the operating wavelength or an increase in frequency, will also cause the gain to rise. All of this will be subject to the efficiency of the reflector and feed combination. If an antenna system is inefficient at 4 GHz, it will operate even worse at 12 GHz. So, don't expect a poorly designed C-band system to be compatible with Ku-band.

Before we can calculate out any gain figures, I must explain what gain figures we are looking for, and why we need these amounts. The extremely high frequencies of Ku-band can be rapidly attenuated by heavy moisture content in the air. Rain will be the greatest culprit. The harder the rain, the worse your reception will be. You can experience as much as 6db or more signal loss due to rain fade. We must add this possible loss to our normal required gain for reliable operation. If our normal required gain is 37db, then we will need at least 43db out of our reflector/feed combination to adequately drive this system in most kinds of weather. Even at this level, it is possible to have a greater signal loss than 6db during inclement weather, which would leave you with unsatisfactory reception.

If we take a typical 10-foot solid reflector, and apply it to our formula, we will end up with what appears to be plenty of reserve gain. Working with a diameter of 3.04 meters, a wavelength of .025 meters, and multiplying this by 3.14, we arrive at 382.53 for an answer. We now

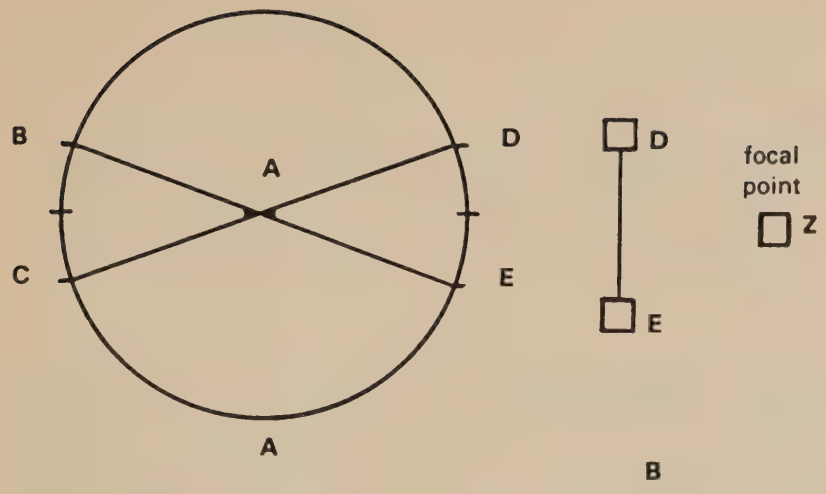


Fig. 1
Typical sectional reflector and cut away of a horizontal section.

square this number, which ends up 146,332 and multiply this by our efficiency of 60 percent and our answer becomes 87,799. This is a power ratio and must be converted to db to be of value now. Once converted, we realize a gain of 49.5db for this reflector. This is a safe amount of gain. The problem arises when you must subtract the 5-6db gain you lose if you are using a mesh type reflector. You are now approaching the lower limit of exceptable gain.

To understand the reasons behind the added loss one ends up with in a mesh antenna, you have to look at the construction of a typical sectional mesh reflector. Fig. 1, will give us a better look at the situation.

If we remember a little about the theory behind a parabolic reflector, we will understand the reason for our losses. A parabolic reflector must be a parabolic curve both vertically and horizontally.

In Fig. 1 we show a sectional mesh reflector with only two horizontal panels. In Fig. 1B we show a cutaway of one section. Along lines A/B, A/C, A/D, and A/E of 1A, we find the curve is indeed parabolic to our feed point Z. These are the ribs that hold the antenna together and they are forced into the curve. If we look at Fig. 1B, we see the mesh between the ribs is another story. The mesh between points D and E, in Fig. 1B, is not curved at all. This, of course, is not without exception. There are a good many sectional mesh reflectors out there that are pulled into a curve physically. You can see, somewhere along the line between points E and F, it might be the right curve, but not everywhere along the line. The antenna has now deviated from the theoretical curve; as the frequency of operation goes up, the accuracy of the surface becomes more critical.

The problem here arises from the fact that the surface tolerance errors have increased and the electromagnetic radiation is not reaching the feed. Due to the decreased size of electromagnetic wave, the tolerances have become more critical.

Another factor of concern is hole density. As the number of holes per square inch decrease, the frequencies with smaller wavelengths tend to penetrate the surface very easily. Obviously, the fewer the number of holes per square inch, the larger the size of the hole, which means there is less reflective material or metal. Therefore, if we use a mesh dish with at least 10 holes per square inch, we will have enough metal present to do a reasonably good job of reflecting the electromagnetic radiation back to the feed.

The efficiency of the reflector is also degraded by the presence of a smaller wavelength. A reflector can be degraded to about 40 percent efficiency due to mesh type design at this frequency. The irregularities of the surface, because of the deviations from the theoretical curve the ribs cause are partly to blame for the lower efficiency numbers. Any deviation approaching approximately ¼ inches or more, will tend to defocus the RF energy. To have an efficiency approaching that of a solid reflector, the size of the holes cannot exceed 1/10 of a wavelength. The size of the 12 GHz wavelength, is approximately 1 inch. So, you can see, as the hole size increases, the efficiency will decrease.

What are the reasons for the different F/D ratios that are used? For the most part, the only reason for using anything greater than .4 is to help shield the feed in an area where there is a T.I. problem. Since at this time there aren't any terrestrial relays at 12 GHz, there is no need for a deep dish. This tells us we should make as much use of the gain available to us as we can. Our F/D ratio should be as close to the minimum as possible, or .4. This doesn't mean that anything greater than .4 will be unsatisfactory but rather, since we have as many other problems as we do, we must get as much signal as possible.

The beamwidth of these antennas poses no problems for 2 degree spacing. As the frequency of operation rises, the beamwidth decreases by the same multiple. That is, an antenna that has a beamwidth of approximately 3 degrees at 4 GHz, will have a beamwidth of approximately 1 degree at 12 GHz. The problems arise due to the narrowness of the beam. Tracking can become difficult, due to the play present in some of today's mounts and actuators.

Some of the sectional reflectors lack rigidity which is another possible area for concern. The potential may be even greater in some mesh dishes. Because of the very thin beamwidth, it is possible in a heavy wind storm your reception may fade in and out as the antenna is moved back and forth. You can lose as much as half your received power, by being off just .04 degrees from the center of the received signal.

This may paint a dim picture for sectional reflectors, but in reality, as is almost always the case, the quality made sectional reflectors will probably operate reasonably well. Look at

the web design to see if it is approaching that 10 hole per square inch target of ours. Make sure it has a rigid structure. Evaluate the mount for slop or any other undesirable characteristics and look for an actuator that is well built, one that is as accurate as possible.

My choices for a compatible reflector, considering the lack of any real solid test data available, would look like this, in order of preference:

1. A solid reflector between 7.5- to 9-feet in diameter.
2. A perforated one-piece reflector with perforations of .25 inches or less.
3. A perforated sectional, because of its ability to follow the curve more easily.
4. A well made sectional mesh reflector.

These preferences are made on the assumption that the reflectors are of quality construction. A poorly made reflector can cause poor reception.

Timothy Cummuta is a systems engineer for Mid-Tec Communications with responsibilities for designing and installing SMATV systems, dealer and distributor training on all products, and systems and technical writing. ■

WTBS Plan: Two Opposing Views

The Turner Broadcasting Company marketing plan to make scrambled satellite TV programming available to earth station owners won praise in one corner, and hot condemnation in another.

Roy Willis, administrative aide to U.S. Congressman Billy Tauzin (D.,La.), said Ted Turner's approach is "a breath of fresh air."

Taylor Howard, chairman of SPACE, and also chairman of the board, Chaparral Communications, Inc., said, "It's pure bull_____." Just Act Two of the same ploy to control TVRO, Howard said.

"I find their plan very encouraging," said Willis. "I think Ted Turner looks at TVRO for what it is: the growth industry of personal communications right now. He is trying to find a way to capitalize on it, and at the same time try to understand the economics that earth station owners have to deal with.

"If the numbers I'm hearing are correct, his pricing more readily recognizes the capital investment that TVRO owners have to make in order to participate in satellite TV communications. I think to some extent he will be a benchmark for other programmers. He's certainly demonstrated he's willing to make the programming of satellite TV a competitive market, and that's encouraging to us right now. But I don't think, frankly, that the plan negates any of the impetus for clarifying in the law the right of access for TVRO owners to satellite TV.

"Until you have the right of access (established by congressional mandate), there's going to be pressure on programmers to switch their signals to the Ku-band, which most satellite people tell me they can't receive without making another major investment, or to keep rates at a level that in effect negates the possibility of competition.

"But I find his plan very encouraging. He's definitely being forthright and that's a good sign, because it's a breath of fresh air. It's an attitude that heretofore hasn't been very widely demonstrated among programmers."

What we have here is an admission by programmers that they want TVRO as a market, Howard said. But never the twain shall meet . . . not yet, anyway.

"The local cable operator is a cable operator, and the local TVRO dealer is another animal altogether," Howard said. "That's their way of saying, 'We want to do business.' Actually, what's going to happen is that the local cable operator is going to go into the TVRO business and compete with the dealer. It's the same as HBO coming out and announcing $19.95 for the price (of HBO and Cinemax per month). Why did HBO do that? Because they wanted to drive you to the cable operator. Well, you go to the cable operator and say, 'What's HBO scrambled going to cost me?' That $19.95 package will be about $12. They're saying, 'Hey, we're TVRO-friendly. Here's the deal.' The TVRO dealer makes a pact with the devil and then he can still remain in business. Well, it won't work.

"In this plan, the cable operator winds up with just a billing operation. He just makes money off it, and the TVRO dealer gets all the headaches. That's not a very good partnership.

"Nothing is acceptable until we have a complete free enterprise system distributing the programming. I don't care whether it's a cable company, Viewer First, whatever it is; there's got to be competition so that people will have a choice and the TVRO dealer has several ways to go."

Howard said the $2 per month cost to consumers to view WTBS programming is exorbitant, too.

"What does it cost a cable viewer to see WTBS? About 20 cents a month, maybe 10 cents in some markets. Two dollars a month is a bloody outrage. Two dollars a year is more like it. It's the same thing as HBO's announcement. We look forward to a market of about $2 a month, but the cable guy will discount that to half of that or below for the service. The reason for that is that WTBS' 800-number won't ring very often because people will want to pay less money for it, and the way to pay less money for it is go the preferential route, which is the cable TV people. Same thing. I guess TBS has figured out what HBO did." ■

European Satellite TV: A New Market For U.S.

by Peter C. Sutro

The growth in the sales and installations of C-band satellite receiving antennas in the U.S. over the last six years can be linked directly to two factors: the number and diversity of programs available on the satellites and the cost and sophistication of the equipment available. Let us examine these two factors in their relationship to the past and future development of satellite television in Western Europe.

In the beginning there was Satcom F1 with its 18 weak transponders and six relatively stronger ones. The first programmers to climb aboard were HBO and a few religious stations; not much there to attract a consumer to spend upwards of $15,000 for a backyard system. But pretty soon Ted Turner saw what was happening and uplinked his puny Atlanta UHF station and created WTBS, the world's first "superstation." Emboldened by his success, Turner created and launched Cable News Network and, later, the Headline News service. ESPN appeared while Showtime and the Movie Channel went up to challenge HBO, who answered with its own complementary service, Cinemax. A couple of other superstations, WOR New York and WGN Chicago, joined the fun along with C-Span and the Weather Channel.

Meanwhile poor old F1 was getting pretty tired and those backyard dishes in the 10- to 12-foot range were developing bad cases of the sparklies; even their giant 5-meter cousins were looking pretty sick. But not to worry, RCA was all set to launch a new satellite to replace F1 with new and more powerful transponders. Disaster struck: the launch failed and Satcom F3 never found its way to orbit and was lost in space forever. It would be eight long months before its replacement, Satcom 3R, could be deployed and the ailing F1 retired to other duties.

During this period other satellites went into orbit. The Westars, 4 and 5 gained a following among the broadcasters and sports networks, and Comstar D4 had some attractive programming. It was suddenly important for the backyard dish to have a mount which could track the polar arc and, preferably, to do it by remote control from the comfort of one's easy chair. TVRO started to bloom, but it was still constrained by the size of the antennas needed for good reception and the cost of the equipment.

Then two amazing things happened: the Hughes Corporation launched Galaxy 1 which was immensely more powerful than any other satellite in the sky causing manufacturers to experiment with antennas in the 6- to 8-foot range with amazingly good results. At the same time the prices of components and systems came tumbling down. LNAs which cost $1,000 and measured 120 degrees Kelvin came down to $150 and measured 60 degrees Kelvin. Receivers which cost $1,000 dropped to $200 and added such features as infrared remote control, block down-conversion and stereo sound. And those antennas that used to cost several thousand dollars and weighed half a ton dropped to under $1000 and became U.P.S. shippable. A revolution indeed!

As more and more programmers jumped ship from Satcom 3R to Galaxy 1, others took their place; Disney, Playboy, MTV, VH 1, Nashville, Bravo, Nickelodeon, Arts and Entertainment, regional sports networks, religious programs and many more found their way on satellite. The sky seemed to be the limit until the specter of scrambling reared its ugly head.

But let's stop the clock here and see how this thumbnail history of TVRO in the U.S. might parallel the development of satellite television in Western Europe.

In the beginning there was Gorizont 1. This ponderous Soviet satellite cast its shadow not only over all of Europe, North Africa and the Middle East, but some of its transponders were beamed to Cuba and Central and South America and could be received in the eastern part of the U.S. One can actually stand in most parts of Europe and hold an LNA attached to a feedhorn feeding a receiver and, just by waving it in the general direction of the satellite, receive a watchable picture consisting of the news according to Moscow and movies about tractors on a collective farm. This excited the faddists and hobbyists of Europe but didn't really create a broad consumer demand. Even the addition of some Arabsat transponders featuring muslim priests in interminable prayer services did not help.

I attended the Cable and Satellite show in Birmingham, England, in the

fall of 1983, where the most interesting exhibit was Satellite TV Antenna Systems, Ltd., which featured live feeds from the Soviet Union, Morocco, Saudi Arabia and the Armed Forces TV network from the U.S. This was something new and exciting for Europe; the only trouble was it required a 30-foot antenna to bring it in clearly. In 1983 the first of a new series of satellites designed to complement if not compete with the Intelsat satellites was launched, Eutelsat I-F1. This Ku-band satellite operates in the 10.95-11.70 GHz frequency range carrying a total of 12 horizontal and 12 vertical transponders and whose West Spot beam provides reception in most of Western Europe on a 1.8-meter (6-foot) antenna.

Climbing aboard this new satellite were programmers such as Music Box (a British clone of MTV), RAI, the Italian State Television Network and various types of programming from Belgium, Norway, France, West Germany, Switzerland and the Netherlands. This entertainment programming, entirely intended for CATV use, while very attractive to the backyard market was still not enough to create a mass market nor to allow the kinds of economies of scale that would drive the price of equipment down to levels which would put it within the reach of the average consumer.

The launching of Cable News Network's Headline service October 1, 1985, may prove to be the turning point in the development of satellite television in Western Europe.

Suddenly, and on a different satellite—Intelsat VA F11—there appeared at 11.155 GHz of the Eastern Beam a powerful signal which was able to be received in almost all of Western Europe on a 6-foot antenna. Why was Ted Turner spending several million dollars per year to bring Atlanta to Europe? Certainly it was not an entirely altruistic motive which spurred him to do this. Keeping in mind the occupancy of European hotels is about 50 percent American and English speaking, and that most luxury hotels have color television sets in each room, one quickly realizes that this is a more or less wasted commodity because of the language barrier. If the hotel could offer one channel devoted to news and information directly from the United States it would furnish an amenity to that English-speaking 50 percent worth a great deal more than anything else the hotel could offer. CNN plans to offer its service to hotels on a rate below 25¢ per room per day. Its other potential customers are embassies, business organizations and banks as well as Americans and other English-speaking residents of Europe who are uncomfortable listening to the news in their host country's language.

Technicians align a six-foot Stolle antenna for CNN reception.

How can CNN be insured of receiving just payment for the unique service they are offering? The obvious answer is to encrypt the signal so that a user, be it a hotel, an embassy or a private citizen, would have to remit a monthly payment to continue to receive the service. It is to be hoped that the system chosen by CNN will be secure enough to insure their revenues but simple enough so as not to cause serious technical and service problems. It would appear that an audio-only encrypt system would be more than adequate.

And now we come to the crucial question of the price of a satellite system in Europe. There is a company in Paris now offering a fixed satellite system, for CNN only, for 39,000 francs or the equivalent of $5,000 plus installation and tax. This is a price that will not capture the mass market in Europe. So, where is the critical point at which the European market will explode because software and hardware have created a fulfillable "want to own"? I believe that it will come within the next six months and that it will be of U.S. origin.

This statement may sound odd given our own total mesmerization with electronic products coming from the Orient and especially from Japan. Europe, however has not yet fallen completely under this strange Eastern mysticism. They still feel a great pride of authorship in products developed in their own countries along with a grudging admiration for U.S. electronics. The Japanese mystique has not captured them yet and I predict that a highly professional U.S. company such as Stolle (a division of Alcoa-NEC) will capture the antenna market in Europe because it can offer a superior product in the small diameters which Europe needs for Ku-band reception at prices which European manufacturers will not be able to touch. In the electronic area it is more difficult to predict, but I feel that if a company such as R. L. Drake puts its resources to work developing a receiver to European specifications it stands a very good chance of capturing a significant portion of the market and of keeping the Japanese manufacturers out. A combination of Stolle and Drake products would prove unbeatable.

In short, I view the European market as being at the same critical point that the U.S. market was at five years ago. The software and hardware are almost in place for a truly enormous market to develop across the Atlantic. ■

Peter Sutro is president of MPI Satellite, Bernardsville, N.J.

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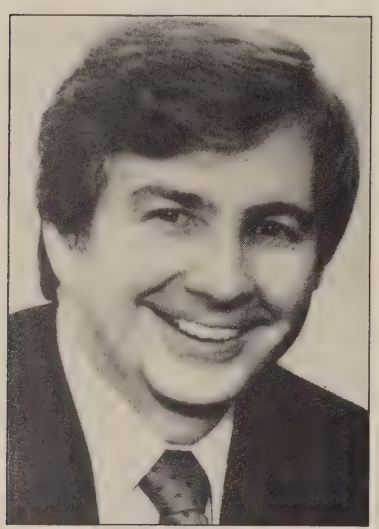
V.I.P. Speakers Featured At EXPO

The SATELLITE OPPORTUNITIES EXPO for Business and Home in Nashville, April 6-8, will include an impressive array of speakers who will address the growing market for business-to-business satellite communications and the rapidly developing DBS market for home TVRO.



White House Press Secretary Larry Speakes will keynote OPPORTUNITIES EXPO.

Held at the Opryland Hotel, the EXPO is expected to attract exhibitors and participants from throughout the satellite communications field, including satellite business users and providers of satellite services, cable operators, and broadcasters as well as TVRO manufacturers, distributors and dealers. The EXPO is the first trade show and national conference bringing together home entertainment and business-to-business satellite communications.

Among speakers participating in the national business-to-business satellite conference are Dr. C. J. Waylan, president of GTE Spacenet and Dr. Yoshihiro Konishi of Japan, one of the world's leading authorities on Ku-band technology.

Eddie Fritts, president of the National Association of Broadcasters, will discuss issues and opportunities in broadcasting, and Larry Speakes, Assistant to the President and White House Press Secretary, will serve as keynote speaker for the conference.

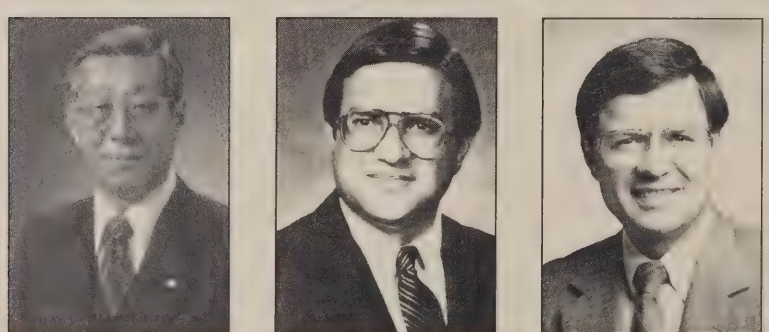
M/A-Com Senior Vice President Jim Bunker will discuss the development of encryption technology in business applications.

A special seminar on Ku-band TVRO technology will include presentations by executives of several corporate groups pioneering in Ku-band DBS technology including Hans Giner, president of Luxor North America.

Other speakers for the event include Fred Del Toro, senior vice president, Hi-Net, Holiday Inn, Inc.; Jim Whitworth, managing director, Systems Engineering, Federal Express; Charles Zito, vice president and general manager, Network Products Division, COMSAT; David Hogan, vice president, marketing, Mobile Communications of America.

The OPPORTUNITIES EXPO is sponsored by *Satellite Opportunities* Magazine, *Ku-band World* Magazine, and The University of Mississippi. The three day event includes separate conference tracks for business-to-business satellite communications and for C/Ku-band TVRO and DBS technology. Registration for either conference includes admission to the trade show.

Registration for the business-to-business conference is $95 in advance and $120 at the door. Registration for the TVRO conference is $30 in advance and $40 at the door. See pages 39-41.



Among OPPORTUNITIES EXPO speakers are (l. to r.) Dr. Yoshihiro Konishi, Uniden's chief scientist and a leading world authority in satellite technology; Eddie Fritts, president of the National Association of Broadcasters; and Dr. C. J. Waylan, president of GTE Spacenet.

April 6, 7, 8 - 1986

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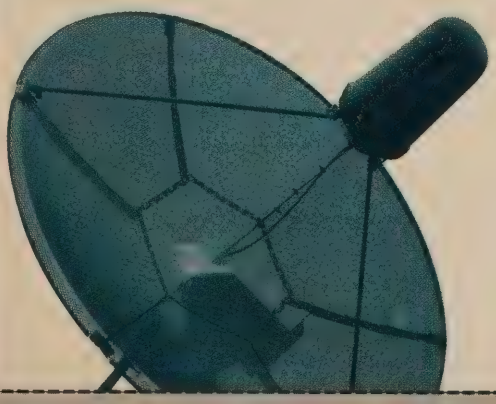

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M/A-Com's VideoCipher Systems Offer Security, Quality, Flexibility

by Dr. Mark Madras

Since 1982, M/A-Com has been actively involved in the development, production, deployment, and support of scrambling systems for the secure satellite distribution of high quality video and audio. This product line of scrambling systems, called VideoCipher, represents the state-of-the-art in security, quality, and flexibility.

VideoCipher systems use the Data Encryption Standard (DES) algorithm of the National Bureau of Standards for the ultimate in security protection. The systems produce a better descrambled signal than can be obtained with clear transmission, even at low carrier-to-noise ratios, and since the audio information and control is transmitted through the horizontal sync interval, the need for audio subcarriers with their accompanying degradation is eliminated.

VideoCipher I descramblers are designed with discrete components for use in commercial applications. They have been in production since January 1984 and have been selected by one of the national broadcast networks to secure its satellite distribution to all of its affiliates.

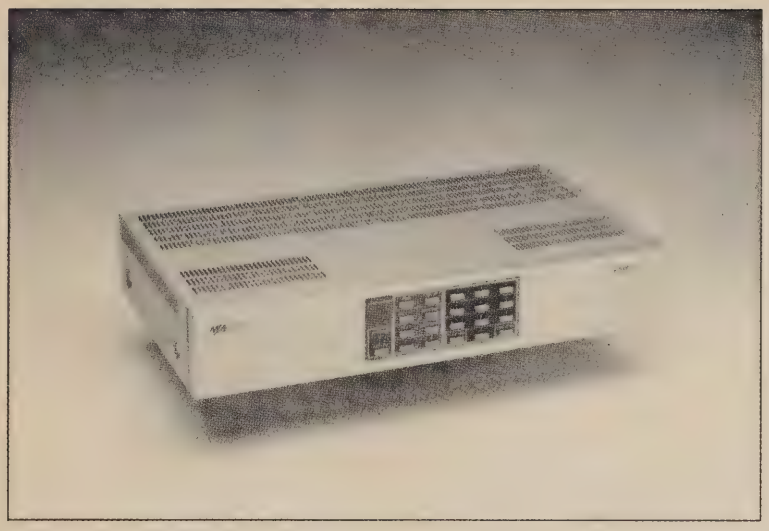
VideoCipher II descramblers are designed with custom VLSI circuit components for high volume, low cost consumer applications with Direct Broadcast Satellite (DBS) systems, as well as for broadcast, CATV, and SMATV applications. The VideoCipher II system has been selected by both HBO and Showtime/The Movie Channel to scramble their satellite distribution to all cable and SMATV affiliates. Four VideoCipher II uplink computers and redundant scrambling subsystems are installed and operational. Over 50,000 VideoCipher II cable head-end descramblers have already been produced, and more than 12,000 are currently installed and operating successfully on a daily basis. VideoCipher II consumer descramblers, when properly authorized, can be used by individual TVRO owners to receive the same programming being transmitted to CATV and SMATV installations. In fact, HBO has already announced its plans for selling programming to individuals with VideoCipher II consumer units.

Since the VideoCipher II system is designed for both CATV and DBS applications, it supports a number of important subscriber features. These include a flexible subscriber interface with an on-screen display, a credit register for impulse pay-per-view, a parental lockout capability, and a text service for program guides, messages, and other information.

A basic VideoCipher II system for scrambling a single channel is shown in Fig. 2-1. The uplink scrambler accepts a standard NTSC video input, two audio inputs, and an auxiliary data signal. Channel and DBS control computers transform CATV and consumer authorization information into addressing and control data, which is also supplied to the scrambler. The scrambler processes all this information to produce a video output signal that has all its spectral energy contained within the standard NTSC 4.2 MHz bandwidth. The scrambled signal is then combined with additional subcarriers (if desired) and transmitted over a C- or Ku-band satellite to cable receiving locations or consumer TVRO's.

At a cable headend, a VideoCipher II commercial descrambler processes the unclamped composite output of a standard FM receiver. If the descrambler is specifically authorized for a given program transmission, it reverses the steps performed at the scrambler to produce clear video, three audio outputs (left, right, and mono), and the auxiliary data signal. The descrambled signals are then distributed throughout the cable system using standard modulators (and cable scramblers, if necessary).

At a TVRO subscriber's home, a DBS satellite receiver contains a VideoCipher II descrambler circuit card or is connected to a separate stand-



M/A-Com's VideoCipher

alone descrambler that is specifically authorized for a given program transmission. The descrambler produces baseband video for a monitor, two audio outputs for a stereo system, and a channel 3 or 4 remodulated video and mono audio output for a TV receiver. An auxiliary data output is also provided for downloading software, controlling various devices, and similar applications at data rates up to 88 kilobits per second.

To provide extremely high quality and security, the scrambler filters and digitizes the two audio channels at the same rate used in consumer digital audio discs. Each digital sample is then added to a random binary sequence generated by the DES algorithm, combined with error coding bits, and interleaved for transmission over the satellite channel. This processing provides DES encryption for the highest possible security. The encrypted audio bits appear to be completely random and can only be decrypted by a descrambler having the appropriate DES key.

The two audio channels, along with the addressing and control information and the auxiliary data channel, are digitally transmitted in place of the horizontal sync pulse in each video line. Video security is provided by the complete absence of all normal sync information (both vertical and horizontal), by inverting the video waveform, and by centering the color burst at a non-standard level.

Since the audio, data, and control information are all part of the 4.2 MHz video signal, no audio subcarriers or additional signal bandwidth are required. As a result, a signal scrambled with VideoCipher II shows up to a 2 dB advantage in video signal-to-noise ratio (for a given carrier-to-noise ratio) relative to an unscrambled signal. The digital synchronization used by VideoCipher II, the digital transmission of audio and control data, and the elimination of audio subcarriers, combine to yield a satellite scrambling system that offers better performance than unscrambled transmission at all carrier-to-noise (C/N) ratios.

The Data Encryption Standard (DES) algorithm of the National Bureau of Standards provides the highest possible security in the VideoCipher II system. The security of DES is based on a 56 bit "key," which is analogous to a password. Even though a "pirate" may possess an authentic descrambler unit and a complete set of drawings, he would not be able to gain access to the system without a valid key being present in his unit.

In order to receive scrambled programming for each billing period (a month, for example), the descrambler must first receive a satellite message containing a monthly key and descrambler service attributes (tiering, credit). This message is separately transmitted over the control channel to each descrambler, encrypted with that descrambler's unique key. Only the intended descrambler, therefore, will be able to decrypt the monthly key and its service attributes. The descrambler then securely stores this information for future use.

Every program is encrypted by the scrambler with a different program key. The program key is combined with program attributes (tiering, rating, cost), encrypted with the monthly key, and broadcast over the control channel to all descramblers. Only those descramblers that had previously received the monthly key, however, will be able to decrypt the program key and attributes, and thus obtain the program.

The VideoCipher II system repetitively transmits individual monthly messages to all authorized descramblers in advance of the billing period. Then by changing keys at program boundaries, VideoCipher II automatically authorizes and deauthorizes the complete set of descramblers with a *single* transmission of the encrypted program key, all according to the program schedule specified by the program provider.

In addition to the regular transmission of monthly messages to active descramblers, new subscribers can be authorized: delinquent or terminating subscribers can be deauthorized, or those requesting a tier change can be accommodated using addressed messages that are transmitted immediately. With an addressing rate of up to 600,000 descramblers per hour, the VideoCipher II system can quickly retier a very large population of subscribers.

A number of key features are an intrinsic part of VideoCipher II. These include protection against security compromise, as well as capabilities for tiered program service, multichannel operation, and program blackouts.

The system has been carefully designed to protect against security compromises. The secret keys in each descrambler cannot be discovered even by opening the descrambler and probing its circuit components. If a descrambler is stolen, it can be quickly terminated from the

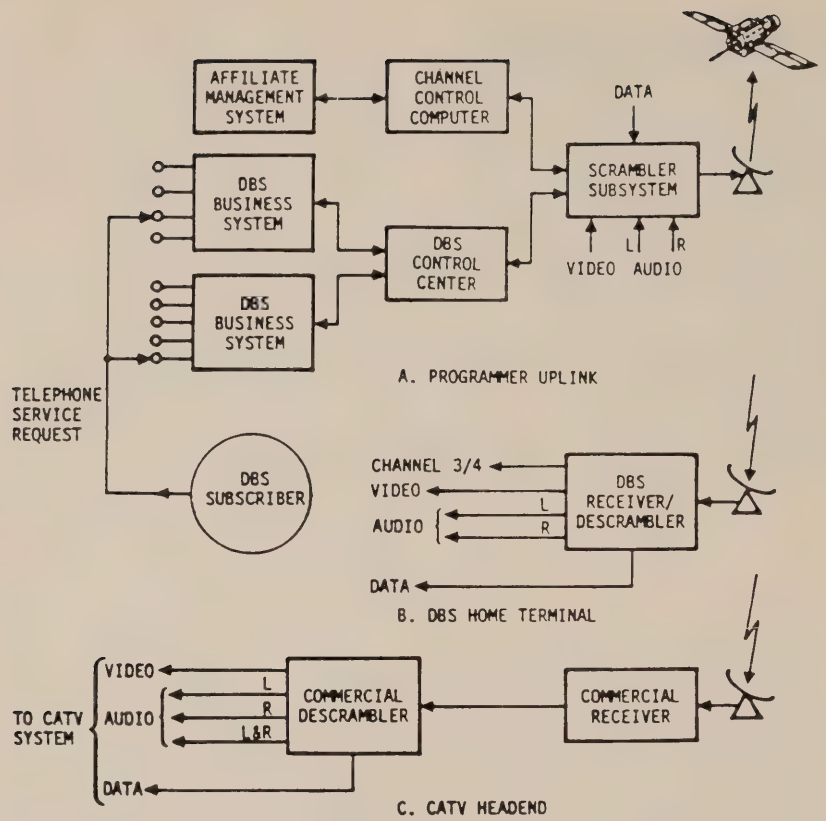


Figure 2-1. VideoCipher II Satellite Television Scrambling System.

uplink. The stolen unit is then useless, since it cannot operate unless it receives proper authorization over the satellite channel.

Flexible control is provided for up to 56 independent tiers of programming that may be offered in any desired combinations. A tier can be general enough to include all programs on one or more channels, or specific enough to select one particular program on a specific channel (prepaid pay per view).

By providing separate tiering information for CATV and DBS descramblers, each programmer has independent control of his channel's cable and SMATV affiliates. Consumer tiering can be common across all channels for the most efficient operation of a DBS service.

Although subscriber-tier changes would nominally be made at monthly (or other billing cycle) boundaries, changes can be made easily at any time. This feature is especially useful for the addition and deletion of subscribers.

The VideoCipher II system is designed for effective and flexible operation in a multichannel environment. Each channel control computer generates the authorization and control messages for that channel's dedicated CATV and SMATV descramblers, as well as a program schedule containing program attributes, and other channel specific information. An affiliate management system at each uplink maintains a data base for the programmer's affiliate descramblers, and provides authorization information to as many as eight channel control computers.

A common DBS monthly key is used to encrypt each DBS program key on every channel. The tiering structure is used both across and within channels to differentiate service to each DBS subscriber. When a subscriber switches from one scrambled channel to another, he would already have the monthly key needed to decrypt the new channel's program key (which is transmitted many times a second). He would therefore begin viewing the new program almost instantaneously, if this program was within his service tier.

Some programs (such as sporting events) may have to be blacked out to both CATV and DBS descramblers in certain regions of the country. The VideoCipher II system provides a very flexible and efficient capability for blackout control. CATV and SMATV descramblers are automatically blacked out by placing them in tiers not authorized for the program in question.

When a DBS subscriber requests service, his descrambler is assigned an xyz coordinate location based on his zip code. In initially authorizing each descrambler, the VideoCipher II system transmits that descrambler's coordinate location over the satellite channel for future use. If a particular program is to be blacked out, the program supplier would be able to define up to 32 independent blackout regions by specifying the center and radius of a circle for each region. Each descrambler, after receiving the blackout region information, would compute whether it was outside of all blackout regions, and if so, would allow viewing of the program. The program supplier can also specify an alternate channel that the receiver/descrambler would automatically retune to if it were in a blackout region.

In addition to providing a prepaid pay-per-view capability through the tiering structure, VideoCipher II also implements an impulse pay-per-view (IPPV) feature which does not require a telephone call or presubscription on the part of the subscriber. The IPPV capability is built around a secure and tamper-proof credit register contained within each descrambler. Access to IPPV features can be controlled by the subscriber through a user-defined password.

The DBS operator can send electronic text messages through the VideoCipher II system to individual subscribers or to tiers. Individual messages are displayed under subscriber control on his TV set. These allow the operator to inform him of a change in status ("You were sent more IPPV credit on 9/18/85"), to send material

(Continued on page 50)

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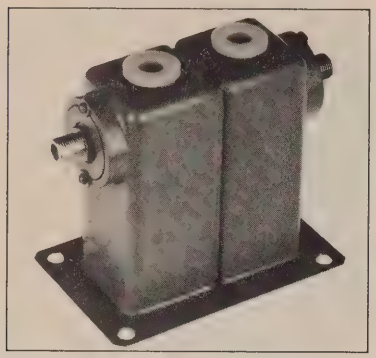
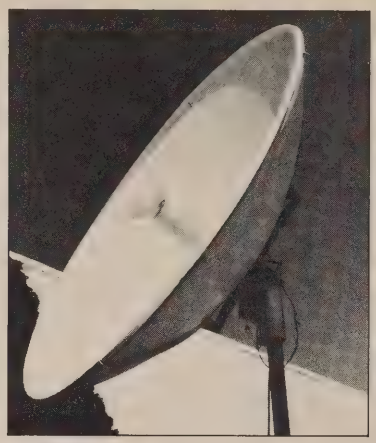


Microwave Filter



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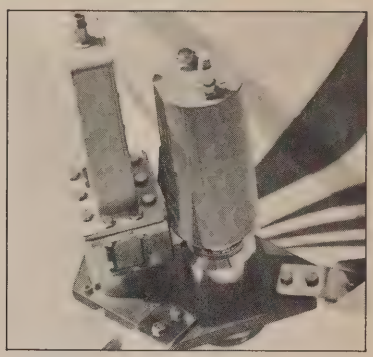

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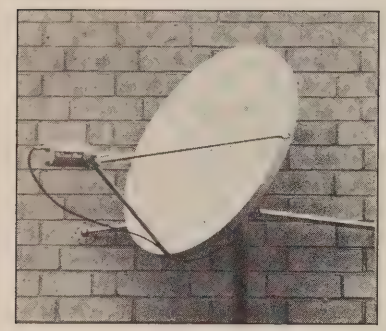

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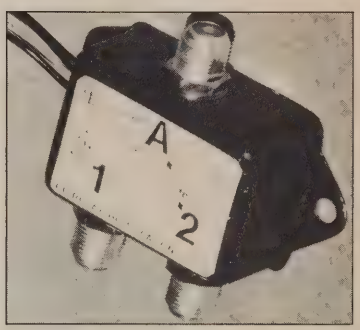

Alaun

Microwave Filter's TVRO/UHF Filter

The 3278(2)-(IF-MHz) series of bandpass filters reduce background noise and are available for TVRO receivers with final IF frequencies in the UHF range: 385—700 MHz. The typical 3 db bandwidth is 14 MHz to restrict the noise bandwidth and produce clearer pictures in low signal situations. Connectors are type F and impedance is 75 ohms. For more information contact Microwave Filter Company, Inc., 6743 Kinne Street, East Syracuse, NY 13057. **Circle No. 129**

Channel Master Ku Antennas

Channel Master has introduced a line of Ku-band antennas with innovative wall and roof mounts designed for quick antenna installation. Both mounts offer a three-leg design for stability and feature a unique ball and socket leg brace. The Channel Master Ku-line includes .75, 1.0-, 1.2-, and 1.8-meter antennas. For additional information write Channel Master, Box 1416, Smithfield, NC 27577. **Circle No. 132**

Southern Star's C/Ku Antenna

Southern Star Satellite Antennas has introduced a new 9.8-foot satellite antenna. The antenna is designed for 4 and 12 GHz operation and is available with commercial AZ/EL, Horizon to Horizon and Robot AZ/EL mounts. An optional microwave fence enhances TI rejection at many problem sites. For more information contact Southern Star Satellite Antennas, Inc. 269—16th St. N., St. Petersburg, FL 33705. **Circle No. 130**

Arunta 419 Interceptor III

Arunta Satellite Telecommunications has introduced the model 419 Interceptor III C/Ku receiver. The Interceptor III is a full featured unit offering several innovations including Opto-interrupt sensor in the drive system providing 192 counts per inch of travel; video frequency tuning in 2 MHz steps, and automatic video inversion. For additional information write Arunta Satellite Telecommunications, 3111 E. Thomas Rd., Phoenix, AZ 85016. **Circle No. 128**

Miralite Dual Feed

Miralite Corporation has introduced its multiband dual frequency feed system for both Ku- and C-bands. Designed to maximize commercial Ku-band performance, the high efficiency 12 GHz feedhorn is jointed at boresite rather than at the side, and the 4 GHz feedhorn is located only one C-band wavelength away. For more information write Miralite, 4050 Chandler, Santa Ana, CA 92704. **Circle No. 131**

Alaun's Relays

Single pole double throw and double pole double throw relays, for remote control/transfer of RF signals in the DC-1 GHz range are being offered by Alaun Engineering. The relays are electro-mechanical with low insertion loss of 0.3 db, high isolation of 90 db (at 50 MHz), low power consumption of 500 MW at 6-12 VDc and polarity sensitive with floating coils. For more information write Alaun Engineering, 2305 Florencita Drive, Montrose, CA 91020. **Circle No. 133**

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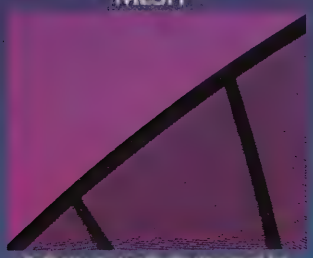

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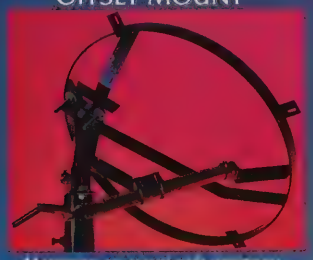

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The heat is on between programmers who will be vying for a share of the potentially lucrative TVRO consumer market, and the competition may mean falling programming prices for the home earth station owner.

Does Scrambling Mean New Business Opportunities?

by John Brannon

There *is* life after scrambling. The skies won't go dark, as some prophets foretold. In fact, they might even glow as new entertainment channels appear and the natural laws of economics force pay-TV rates to lose weight.

That includes new TVRO business opportunities that span all the way from Hollywood to New York and little towns in between.

That's the opinion of officials at the helm of two of the premier programming services, Home Box Office and Showtime, as well as many leaders in the TVRO industry.

"There are new business opportunities for Showtime, for cable operators, for TVRO dealers—for everybody involved in the business," said Stephen Schulte, senior vice president of operations, Showtime.

Roy Mulhall, corporate vice president, Uniden Corporation, told a panel audience at the January C.E.S. show that scrambling presents 'a wonderful marketing opportunity.' The free market fight between services to get the business of dish-owning viewers will do a great deal to advance the interests of the home satellite business, Mulhall said in a separate interview. He also said Uniden anticipated sales of up to one million units if it could gain entry into major retailers.

Now that full-time scrambling is a reality, the mood at HBO is one of relief, with a healthy mix of pride. The scrambling mechanism, both hardware and marketing, is in place and working, says Allen Levy, manager of corporate public relations. Several hundred earth station owners have already subscribed to HBO's scrambled channels. Although that's a small percentage compared to an estimated 1.5 million private TVRO systems, it's a start.

During the months leading up to that infamous day when the "Big Switch" was flipped, HBO had two priorities: scramble its satellite TV programming to foil pirating of signals for commercial profit, and to develop a marketing plan to serve earth station owners. Having accomplished those goals, HBO will turn its attention toward the inevitable clash among about 15 programmers who followed HBO's lead and signed up for M/A-Com's VideoCipher II encryption system. All are expected to fiercely compete for TVRO viewers' time and dollars.

Showtime, committed to scrambling its entertainment channels (Showtime, The Movie Channel, and others), had already shipped 9,000 commercial descramblers to its cable affiliates, hotels/motels, and SMATV operations. Showtime claims about 6,800 affiliates, some of which have multiple headend systems. In cable systems, for each satellite TV channel offered, only one descrambler may be used.

Like HBO, Showtime furnished

commercial descramblers free to its affiliates in good financial standing at a cost of "a little less than HBO's," which was about $10 million. Showtime has about 8.5 million individual subscribers, not counting the potentially lucrative TVRO consumer market.

Showtime's marketing plan for TVRO will be unveiled this spring, and apparently will parallel HBO's. But one item that won't imitate HBO is Showtime's consumer price structure.

Briefly stated, the fight is on.

"We always compete with HBO and Cinemax," said Tola Baran, Showtime's director of industry public relations. "We intend to be very competitive."

"What will happen is we're going to respond to a competitive environment," declares HBO's Levy.

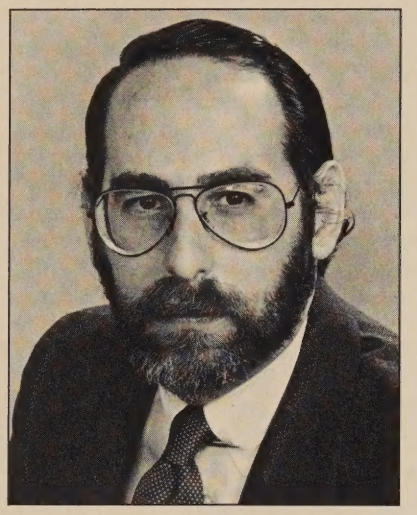
Do we hear prices falling? At the outset, HBO fixed its prices at $12.95 monthly for HBO or Cinemax movie channels, or $19.95 for both.

"We assure that a good number of hotels that once pirated HBO and Cinemax will become authorized, and obviously that will be an additional revenue stream for us," Levy said. "And we expect that a good number of dish owners are going to become subscribers, and that benefits both HBO and cable operators. So scrambling provides new business opportunities."

So where does that leave the TVRO manufacturer, distributor and dealer?

"As far as dish retailers are concerned, as more and more programmers scramble, they're going to sell a lot more descramblers, and there's going to be competition among programmers," Levy said. "What we learned at cable is that a cable subscriber is typically taking one or two pay services. So we think a dish owner is going to pick and choose. We don't think he'll take HBO and Cinemax and Showtime and The Movie Channel. So HBO is going to compete with Showtime.

"That means there're going to be marketing opportunities as HBO and Showtime court dish owners. There will be advertisements placed, some direct mail campaigns, all kinds of marketing geared toward this segment of dish owners. All these programmers are going to start marketing activities that will enhance the profile of the home dish industry. There's going to be a lot more awareness of dishes, and that may actually serve to increase sales."



Stephen Schulte

Other indications of competition are plans which are "well past the drawing board" for more satellite TV entertainment channels. HBO noticed that its HBO Premier films were favored by older viewers reportedly fed up with the usual fare of sex and violence. To serve that age group, HBO plans an additional movie channel with films rated "G" and "PG." An initial marketing test may begin this spring.

Showtime may follow suit. "I would anticipate that whatever we announce will follow suit," Schulte said. "The Showtime staff wants to be consumer friendly. It is our intention, if it is practical, to serve as many consumers as we can with our product."

Its product may not be limited to entertainment programming. Other services may be offered. "Our company had that discussion a long time ago," Schulte said. "What kind of company are we? Are we a communications company? Are we an entertainment company? Showtime sees itself as a program distributor and supplier. Right now it's strictly entertainment, and we haven't offered any non-entertainment services. But that doesn't mean we are not thinking about them and we are not working on alternative and ancillary things that would benefit the consumer."

Levy said now that the TVRO marketing program has been set up, HBO will take steps to further refine it. He said once a dish owner has his consumer model descrambler in hand, the hook-up is much like that of a VCR. The dish owner calls either the cable affiliate or the HBO toll free subscription number (1-800-HBO-DISH), furnishing basic identifying information, such as name and address and serial number of the descrambler. From that point until the service starts coming in unscrambled is about 15 minutes. You get authorized, you get billed, and "no, we don't need to receive a check up front before we turn you on." Nor does the dish owner have to pay an installation charge, as in cable services.

A consumer model descrambler will not work in an SMATV mode. But . . . human nature being what it is, what if someone takes his descrambler from his home and places it in his bar?

"Yes, there will be penalties for it," Levy said. "And those penalties are specified in the Cable Communications Act of 1984. It has language about individuals who have dishes. If somebody makes commercial use of it, that's piracy. There can be criminal prosecution with fines up to $1,000 and imprisonment up to six months for the first offense. Other violations may result in a $25,000 fine and imprisonment up to one year. So it's tough on guys who pirate, take the signal and make commercial use."

Showtime's Schulte said the company considered scrambling its signals as early as 1980, but backed off because commercial descramblers at that time might cost as much as $5,000 each. "And over the past five years we've seen that price go down from $5,000 to $500," Schulte said, "so obviously, the time was right—and the technology, too."

A distastful situation in its own network prompted Showtime to look at scrambling back in 1980. Its own credit and collection department had no way of turning off Showtime affiliates that didn't pay their bills. Now, that has changed. With a flip of a

switch, Showtime can shut down services to any of its affiliates at a moment's notice, and undoubtedly chaos would erupt within the subscriber network of the affected affiliate.

"It's a wonderful deterrent to make sure you're being paid on time," Schulte said.

Levy said Hollywood motion picture moguls favored scrambling, and that Warner Brothers studios had been very outspoken about it. Always there was the scenario of hotels, motels and other businesses using satellite TV signals for commercial gain. The attitude in Hollywood was, 'I'm not sure I'm going to give you the big motion pictures if there are people watching it for free. I'm not making any money from those people, and they're watching my movies.' Scrambling has lowered the Hollywood heat considerably, he said.

Schulte agrees.

"Hollywood was concerned about the number of people that were taking signals down illegally, but they are primarily concerned with the commercial operator," he said. "We saw that it wasn't single family homes taking the signals, or farmers, or ranchers. It was apartment complexes where one earth station was serving 40, 50 or as many as 300 dwelling units. That's when the number of homes justified the scrambling expenses.

"It's enough to make your hair curl if you're a programmer. Just go to the Bahamas and see what goes on down there. It's incredible. Every hotel has at least two dishes. And those folks aren't paying anything. So a lot of people were concerned; Hollywood (and the cable operators) because this was happening right in the middle of their franchise areas and nothing could be done about it, other than lawsuits, which are extremely expensive and the appeals process could take years. The real reason that we have scrambled is because of commercial theft of the service."

That Congress would want to explore the impact of scrambling on the owners of satellite earth stations is understandable, Levy said, especially in light of the 1.5 million systems in use. "The majority of them are in rural areas where they're fortunate if they're getting one or two off-the-air signals," he said, "so it's obvious that Congress would be interested. We're certainly more than willing to go up there and explain again our reasons for scrambling, and also to describe what kind of marketing mechanism we created to serve that community."

Schulte said, "I think, finally, the air will be cleared."

Schulte said sooner or later Showtime will move to Ku-band for its satellite frequencies. "We are obviously in discussion with RCA and several other carriers that provide Ku-band services. Right now we have adequate C-band services, and we don't see an immediate need for Ku-band. We are talking to all these vendors to have them help us understand why Ku-band is something that we need now. In the future, there are some benefits to having Ku-band, and the ease of use with regard to terrestrial interference will probably be the most significant. We have a transmission capability now. It works. Maybe when that runs out, we'll move up to the next grade of service."

Levy said the Ku-band subject is much on the minds of HBO planners, and consumer TVRO systems are going to be an item of interest at industry shows.

"I think Ku-band is going to be a growing segment," Levy said. "In fact, I'm going to be walking the SPACE show and one of the things I'm going to be looking at is the development of equipment that receives both C-band and Ku-band: where it is, what manufacturers are thinking about availability-wise and pricing-wise, and just what the market will be like as we move toward Ku-band transmissions." ■

M/A-COM

(Continued from page 44)

requested by the subscriber (closing quotes on a personal stock list), and to transmit other subscriber specific information. Messages can also be sent to all subscribers of a particular tier for display at a specified time and for a specified duration, such as a reminder of a special upcoming program.

In addition to the message service, the system also supports a versatile information service capability. This service allows DBS subscribers to easily access text data bases broadcast by the programmers, such as a program guide, news services, and other material of interest. Up to 256 different pages can be transmitted on each channel, organized into any number of scrolls with whatever levels of hierarchy the programmer desires.

The two digital audio channels in the system can be either a stereo pair, or two completely independent audio signals for supporting a dual language capability. In the latter case, a control channel message instructs the receiver/descrambler to switch to a mono mode and route one audio channel to all audio outputs. The switching is performed on the digital audio data, thus providing channel separation of at least 75 dB. The subscriber can use his keypad to determine which audio channel, and therefore, which language, is routed to his audio outputs for listening.

The VideoCipher II system represents the state-of-the-art in high quality, extremely secure satellite video distribution to cable and DBS descramblers. Both types of descramblers install easily and produce better video and audio than can be obtained with an unscrambled transmission. A spare VideoCipher II cable descrambler can support multiple services, with each program provider having independent and secure access to the descrambler. A single DBS consumer descrambler can be authorized to receive all VideoCipher II scrambled channels offered by a single DBS control center. Consumer descramblers also include important subscriber features for receiving text messages and data bases, for impulse purchases of pay-per-view programs, and for viewing control by program rating. As an ever increasing number of program providers select the VideoCipher II system, it is rapidly becoming the standard in satellite video scrambling.

Dr. Mark Madras is assistant vice president of M/A-Com Video Products Group. ■

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